

PARKS

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Developing capacity for a protected planet

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IUCN PROTECTED AREA DEFINITION, MANAGEMENT CATEGORIES AND GOVERNANCE TYPES

IUCN DEFINES A PROTECTED AREA AS:

A clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.

The definition is expanded by six management categories (one with a sub-division), summarized below.

Ia Strict nature reserve: Strictly protected for biodiversity and also possibly geological/ geomorphological features, where human visitation, use and impacts are controlled and limited to ensure protection of the conservation values.

Ib Wilderness area: Usually large unmodified or slightly modified areas, retaining their natural character and influence, without permanent or significant human habitation, protected and managed to preserve their natural condition.

II National park: Large natural or near-natural areas protecting large-scale ecological processes with characteristic species and ecosystems, which also have environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities.

III Natural monument or feature: Areas set aside to protect a specific natural monument, which can be a landform, sea mount, marine cavern, geological feature such as a cave, or a living feature such as an ancient grove.

IV Habitat/species management area: Areas to protect particular species or habitats, where management reflects this priority. Many will need regular, active interventions to meet the needs of particular species or habitats, but this is not a requirement of the category.

V Protected landscape or seascape: Where the interaction of people and nature over time has produced a distinct character with significant ecological, biological, cultural and scenic value: and where safeguarding the integrity of this interaction is vital to protecting and sustaining the area and its associated nature conservation and other values.

VI Protected areas with sustainable use of natural resources: Areas which conserve ecosystems, together with associated cultural values and traditional natural resource management systems. Generally large, mainly in a natural condition, with a proportion under sustainable natural resource management and where low-level non-industrial natural resource use compatible with nature conservation is seen as one of the main aims.

The category should be based around the primary management objective(s), which should apply to at least three-quarters of the protected area – the 75 per cent rule.

The management categories are applied with a typology of governance types – a description of who holds authority and responsibility for the protected area.

IUCN defines four governance types.

Governance by government: Federal or national ministry/ agency in charge; sub-national ministry/agency in charge; government-delegated management (e.g. to NGO)

Shared governance: Collaborative management (various degrees of influence); joint management (pluralist management board; transboundary management (various levels across international borders)

Private governance: By individual owner; by non-profit organisations (NGOs, universities, cooperatives); by for-profit organisations (individuals or corporate)

Governance by indigenous peoples and local communities: Indigenous peoples' conserved areas and territories; community conserved areas – declared and run by local communities

For more information on the IUCN definition, categories and governance type see the 2008 *Guidelines for applying protected area management categories* which can be downloaded at: www.iucn.org/pa_categories

IUCN WCPA'S BEST PRACTICE PROTECTED AREA GUIDELINES SERIES

IUCN-WCPA's Best Practice Protected Area Guidelines are the world's authoritative resource for protected area managers. Involving collaboration among specialist practitioners dedicated to supporting better implementation in the field, they distil learning and advice drawn from across IUCN. Applied in the field, they are building institutional and individual capacity to manage protected area systems effectively, equitably and sustainably, and to cope with the myriad of challenges faced in practice. They also assist national governments, protected area agencies, nongovernmental organisations, communities and private sector partners to meet their commitments and goals, and especially the Convention on Biological Diversity's Programme of Work on Protected Areas.

A full set of guidelines is available at: www.iucn.org/pa_guidelines

Complementary resources are available at: www.cbd.int/protected/tools/



PARKS: THE INTERNATIONAL JOURNAL OF PROTECTED AREAS AND CONSERVATION

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PARKS is published to strengthen international collaboration in protected area development and management by:

- exchanging information on practical management issues, especially learning from case studies of applied ideas;
- serving as a global forum for discussing new and emerging issues that relate to protected areas;
- promoting understanding of the values and benefits derived from protected areas to communities, visitors, business etc;
- ensuring that protected areas fulfill their primary role in nature conservation while addressing critical issues such as ecologically sustainable development, social justice and climate change adaptation and mitigation;
- changing and improving protected area support and behaviour through use of information provided in the journal; and
- promoting IUCN's work on protected areas.

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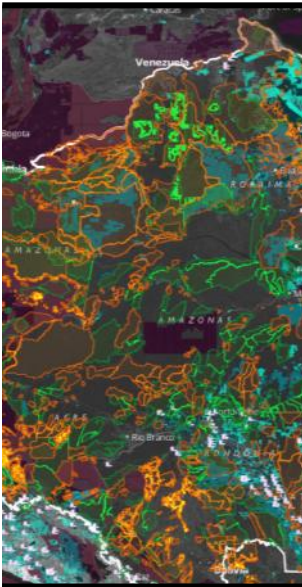
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EDITORIAL: TO GO, OR NOT TO GO? WHAT ARE BUSINESS ATTITUDES TO THE PHILOSOPHY OF NO-GO POLICIES AND PROTECTED AREAS?

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We assume that protected areas are protected. We know that this protection is imperfect; that many protected areas are not effectively managed (Leverington et al, 2010) and that there is an increasing tendency for governments to retreat from commitments in a phenomenon labelled Protected Area Downsizing, Downgrading and Degazettement (PADDD) (Mascia & Pailler, 2011). Local people may reject the concept of a protected area and continue to access resources within these areas that they directly depend on for their livelihoods. There is an expectation, at least in the richer countries where people's livelihoods do not directly depend on natural resources from their protected areas, that the mass of society accepts that some areas of land and water should be set aside from development. The large majority of countries that have signed the Convention on Biological Diversity and agreed to its Aichi targets have made a legal commitment to protected areas.

But in reality protection is almost always partial. Human rights, social concerns and the presence of indigenous or local communities mean that many protected areas are designed to accommodate human presence. Most also allow and indeed encourage visitors to enter. Marine protected areas permit shipping to pass as required under international law and very few protected areas have restrictions on air traffic. Some apparently strict protected areas have no control over mineral prospecting, fishing, hunting, use of snowmobiles, etc. Marine protected areas may only protect a certain part of the water column. Many national parks in developing countries that once strictly controlled access are opening up to forms of use such as collection of medicinal herbs, fodder and limited use of other natural resources. The situation is changing all the time.

So in practice, most biodiversity conservation no-go policies refer to specific types of activity, and focus on activities that can permanently destroy or degrade an ecosystem: focusing on new development rather than the continuation of traditional practices. Policies can be subdivided in a number of ways; for instance, restrictions on (not a complete list):

1. Conversion: e.g., complete replacement of a forest with soy, oil palm, intensive tree plantation, farm or cattle pasture;
2. Extraction: e.g., of timber from a natural forest (that remains a forest), hunting, minerals;
3. Significant alteration: e.g., through pollution, hydrological disturbance;
4. Heavy use: e.g., a transport route, major road development or through intense tourism;
5. Any use: e.g., sites where any human visitation is of concern due to presence of highly sensitive species, risks of introducing invasive alien species or disease.

Option number 5 is vanishingly rare and often linked with a sacred or religious taboo rather than a conservation policy, like some islands off the coast of Madagascar or the tops of mountains in Bhutan (Wild et al, 2010). Option 2, on the contrary, is increasingly enforced by indigenous peoples and local communities that control their own territories, which frequently overlap with protected areas or are recognised Indigenous and Community Conserved Areas (ICCAs), by monitoring illegal extraction and lobbying to hold companies and individuals causing environmental damage responsible. Concern about corporate incursion into community-held lands or the territories of indigenous peoples is an important incentive for such groups to collaborate with protected area authorities against a common threat.

HOW HAVE COMPANY ATTITUDES TO NO-GO CHANGED SINCE 2000?

A particular question relates to whether commercial companies unconnected with protected area values and management should have access to protected areas, and if so which kinds and when. Given the huge power of the largest companies, it is important to understand how they interpret no-go policies in protected areas.

The strongest reactions have tended to come from the extractives industry: the discussion below focuses particularly on this sector. The issue of no-go gained additional publicity in 2000, when the IUCN World Conservation Congress (WCC) in Amman, Jordan, passed a recommendation (IUCN Recommendation 2.82) that mining should be banned in category I-IV protected areas. A *recommendation* is not as powerful or binding a WCC decision as a *resolution*, but was significant enough to create a powerful backlash; it quickly became clear that some of the world's largest resource companies had massive investments inside protected areas. The WCC motion created ripples that still reverberate today. It was followed by other WCC recommendations for example: 4.136 Biodiversity, protected areas, indigenous people and mining, 147 Protection of sacred natural sites and also resolutions such as: 3.060 Influencing private sector actions in favour of biodiversity, 3.061 IUCN's interaction with the private sector and 3.075 Applying the precautionary principle in environmental decision making and management. In addition, in 2013 the Wild 10 conference adopted a motion for no mining in any protected area, in 2014 the IUCN World Parks Congress made statements about no-go, particularly in reference to World Heritage sites (Anon, 2014), and the 2016 WCC, taking place in Hawaii, will also debate a recommendation for banning mining in all IUCN categories of protected areas.

So how has industry responded since 2000? A state of knowledge study for WWF UK reveals that while many have developed comprehensive environmental policies over the past fifteen years, they still generally resist a no-go policy and that the strongest opposition remains clustered around the mining sector.

The International Finance Corporation has *Performance Standards*, of which PS6 deals with biodiversity and conservation. This is not a no-go standard but imposes important restrictions on companies that follow its code, including banks following the Equator Principles, a risk management framework. The International Council on Mining and Metals (ICMM) has imposed a voluntary no-

go policy on exploration and operations in natural World Heritage sites since 2003; this is the strongest attempt at a no-go policy within the extractives industry but remains limited in uptake and unpopular within the boards of many signatory companies. The International Petroleum Industry Environmental Conservation Association has a more muted policy, stating that companies should: 'Understand the location and significance of protected areas, endangered species, sensitive habitats and key natural resources' (IPIECA & OGP, undated). The Initiative for Responsible Mining Assurance, a new certification scheme (www.responsiblemining.net/), has released a draft standard that includes stricter controls: "The corporate owner(s) shall not carry out any new mining or related activities in: World Heritage sites, nominated World Heritage sites, IUCN category I-IV protected areas, category I-V marine protected areas and core areas of UNESCO biosphere reserves." It is not yet clear if this clause will be included in the final standards. The World Business Council on Sustainable Development does not have a no-go policy, nor does it mention protected areas in its *Vision 2050: A New Agenda for Business* (WBCSD, 2010). The closest it comes is a statement on forests: "Primary forest coverage is held intact and expanded somewhat" (sic).

Outside the extractives sector, several industry associations have imposed voluntary bans on habitat conversion in specific places, for example a moratorium on clearing Amazon rainforest to establish soy in Brazil (WWF, 2014), and agreement by several soy, oil palm and timber plantation groups that they will not clear areas identified as High Conservation Value (Brown et al, 2013) through an accredited process.

The situation with individual companies is complicated. A growing number have policies that mention High Conservation Value Areas although most fall short of making explicit commitments. Anglo American's position is typical; apart from following ICMM's lead in avoiding natural World Heritage sites, it states: 'We shall demonstrate active stewardship of land, freshwater systems and biodiversity with which we interact' according to CEO Cynthia Carroll in 2007. Nestlé is stronger: 'Suppliers will not source products from IUCN protected areas categories I-IV, UNESCO World Heritage Sites and wetlands on the Ramsar List' (Nestlé, 2013). Conversely, Shell is candid about operating in some strictly protected areas: 'We believe some areas are too sensitive to enter. But we also believe that through a transparent process, partnerships and stringent operating practices it is possible to operate responsibly in some areas that are under protection or rich in

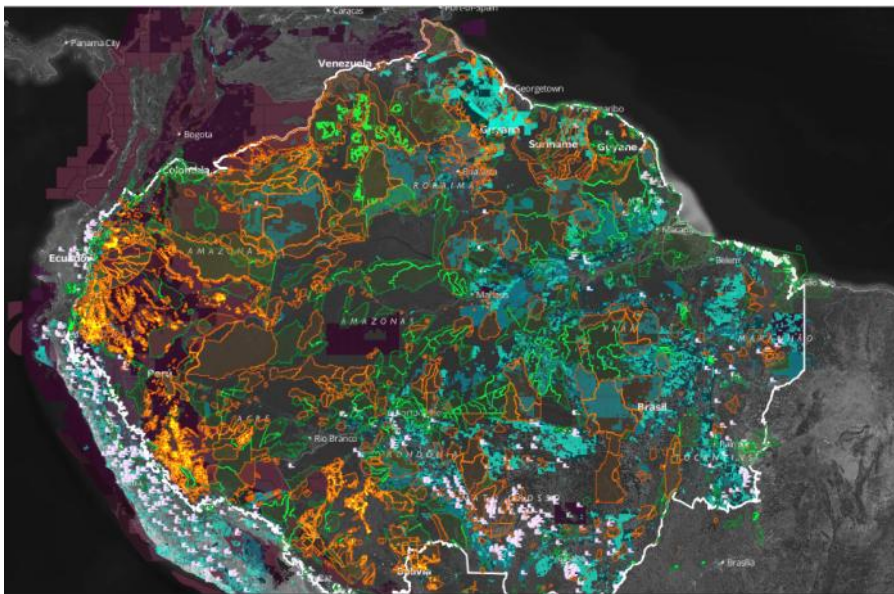


Figure 1: Impact of development in the Amazon.

Legend: purple; oil and gas, turquoise; mining, orange; indigenous territories, green; protected areas, pink; hydropower stations, yellow; deforestation.

biodiversity' and again 'We will further improve the way we operate in IUCN Category I-IV protected areas, and areas of high biodiversity value. We will publicly report on our activities in IUCN Categories I-IV' (Shell, undated). Banks supplying funds for mining operations also have a variable response, with for example some refusing to finance large scale coal mining likely to impact negatively on the Great Barrier Reef in Australia. The World Bank's review process concerning its investments in the extractive industries sector and the International Finance Corporation process of reviewing its safeguard policies make no mention of protected areas or no go policies (World Bank & IFC, 2015).

Many companies take a similar approach to Shell's policies, noted above, and commit instead to minimising impacts when they do operate in protected areas, usually through a Biodiversity Action Plan and offsetting policies. The BG Group's position is typical: '... operations in National Parks or similar nationally legally protected areas ... shall not be implemented unless the following requirements are met: there are no measurable adverse impacts on the ability of the habitat to support the established population of species or functions of the habitat that define it as "critical"; there is no reduction in the overall population or sustainability of any recognised critically endangered or endangered species; and any lesser impacts are mitigated to achieve no net loss of biodiversity' (BG Group, 2013).

What does this really mean in practice? There has never been a survey of the number of companies operating in protected areas so it is impossible to say how common this is, although the trend seems to be for an increase. A study in Africa found 27 per cent of natural World Heritage sites had oil and gas concessions inside their borders although none were currently operational (Osti

et al, 2011); an expected boom in African mining (Edwards et al, 2014) could rapidly change this. Together protected areas and indigenous territories put 49.9 per cent of the Amazon's total habitat under protection (Maretti et al, 2014). This protection is literally being undermined by extractive industries (figure 1). Thirty five per cent of the Amazon is under some form of mining (or oil and gas) development including an overlap of 15 per cent with protected areas (410 in total) and 19 per cent with Indigenous territories (3,043 in total) (Courtesy of InfoAmzonia, based on RAISG, 2013). Analysis of mining relating to four key metals found 6 per cent of protected areas by areal coverage had mines inside their borders and a further 14 per cent had mines within 10 km; a fifth of the world's protected area coverage was affected by aluminium, copper, iron and zinc alone (Durán et al, 2013). The continuing debate about the Arctic National Wildlife Refuge is a clear demonstration of corporate intentions.

Protected areas need a comprehensive policy response to these challenges; one that recognises that a powerful sector in general rejects any concept of protected areas that excludes natural resources use. There have already been important initiatives to build better links with industry, both by IUCN and through groups such as Energy and Biodiversity Initiative. These efforts have undoubtedly improved practice, through best practice guidelines and the use of BAPs.

So on paper the situation is depressing. For instance, many governments have proved reluctant to impose any kind of blanket protection of protected areas from mining and there is potential for a massive increase in mining activity in protected areas. Nonetheless, in some countries there has been strong support for a ban on mining in protected areas. In 2010, the New Zealand

government abandoned a proposal to open up some of their protected areas to mining after a very vocal public and scientific community opposition to the proposal. It is also clear that many in the oil and mining sector do not relish risking a public relations disaster and boycotts through trampling over conservation policies. It is probable that boardrooms and shareholders from a wide range of companies around the world are increasingly split on these issues. Maintaining public pressure against mining in protected areas and areas of high conservation value; through advocacy, law suits and policy lobbying is currently the conservation lobby's best chance of preventing widespread damage from mining in hitherto pristine areas, although we would be naive to expect that changes will come easily.

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REFERENCES

Anon (2014). Joint NGO statement on no-go and no-impact measures for extractive activities in natural and mixed World Heritage sites, <http://worldparkscongress.org/drupal/sites/default/files/documents/news/NGO%20WHS%20no-go%20statement%20final%20with%20logos%2018-11-14.pdf> accessed 30th November 2015

BG Group (2013). *BG Group Standard Environmental Standard BG-ST-HSSE-ENV-001*, version 2.1 May 2013.

Brown, E., N. Dudley, A. Lindhe, D.R. Muhtaman, C. Stewart and T. Synnott (eds.). (2013) *Common guidance for the identification of High Conservation Values*. HCV Resource Network, Oxford.

Durán, A.P., J. Rauch and K.J. Gaston. (2013). Global spatial coincidence between protected areas and metal mining activities. *Biological Conservation* **160**: 272-278. DOI:10.1016/j.biocon.2013.02.003

Edwards, D.P., S. Sloan, L. Weng, P. Dirks, J. Sayer and W.F. Laurance. (2013). Mining and the African environment. *Conservation Letters* **7** (3): 302-311. DOI: 10.1111/conl.12076

HSBC (2014) *World Heritage and Ramsar Wetlands Policy*.

IPIECA and OGP (undated) *Managing Biodiversity Impacts: 10 tips for success in the oil and gas industry*, Information sheet.

Leverington, F., K. Costa, H. Pavese, A. Lisle and M. Hockings (2010). A Global Analysis of Protected Area Management Effectiveness. *Environmental Management*: 48: 685-698. DOI: 10.1007/s00267-010-9564-5.

Maretti, C.C., Riveros S., J.C., Hofstede, R., Oliveira, D., Charity, S., Granizo, T., Alvarez, C., Valdujo, P. and C. Thompson. (2014). *State of the Amazon: Ecological Representation in Protected Areas and Indigenous Territories*. Brasília and Quito: WWF Living Amazon (Global) Initiative. 82pp.

Mascia, M.B. and S. Pailler (2011). Protected area downgrading, downsizing, and degazettement (PADDD) and its conservation implications. *Conservation Letters* **4**: 9-20. DOI: 10.1111/j.1755-263X.2010.00147.x

Nestlé (2013). *Nestlé in Society: Creating shared values and meeting our commitments 2013*, Switzerland.

Osti, M., L. Coad, J.B. Fisher, B. Bomhard and J.M. Hutton. (2011). Oil and gas development in the World Heritage and wider protected area network in sub-Saharan Africa. *Biological Conservation* DOI: 10.1007/s10531-011-0056-6.

RAISG. (2013). *Amazonia under pressure*. Amazonian Network of Georeferenced information. Bogotá (Colombia); Caracas (Venezuela); Lima (Perú); Paramaribo (Suriname); Quito (Ecuador); Santa Cruz de La Sierra (Bolivia); Belém and São Paulo (Brasil)

Shell (undated) *Operating in areas of high biodiversity value*. (accessed November 2015) <http://www.shell.com/global/environment-society/environment/biodiversity/protected-areas.html>

United Nations (2011). *The UN Guiding Principles on business and human rights, Implementing the United Nations; "Protect, Respect and Remedy"* United Nations, Human rights, Office of the High Commissioner, United Nations, Geneva and New York. http://www.ohchr.org/Documents/Publications/GuidingPrinciplesBusinessHR_EN.pdf

WBCSD (World Business Council on Sustainable Development). 2010. *Agenda 2050*, Geneva, Switzerland.

World Bank and IFC (2015). Extractive Industries Review. (accessed November 2015) http://www.ifc.org/wps/wcm/connect/Industry_EXT_Content/IFC_External_Corporate_Site/Industries/Oil,+Gas+and+Mining/Development_Impact/Development_Impact_Extractive_Industries_Review/

Wild, R., Verschuuren, B., and Mcneely, J. (2010). Conclusions: Sustaining Sacred Natural Sites to Conserve Nature and Culture. In B. Verschuuren, R. Wild, J. Mcneely, & G. Oviedo (Eds.), *Sacred Natural Sites: Conserving Nature and Culture*. (pp. 281-291). Earth Scan, London

WWF. (2014). *The Growth of Soy: Impacts and solutions*. WWF International, Gland, Switzerland.



BUILDING A CULTURE OF CONSERVATION: RESEARCH FINDINGS AND RESEARCH PRIORITIES ON CONNECTING PEOPLE TO NATURE IN PARKS

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ABSTRACT

Beyond the myriad ecological, economic and cultural values they provide, parks provide a touchstone to the natural world and in an increasingly urbanized and hectic society they are important spaces for building social capital and for building a culture of conservation among citizens. Many park agencies are focusing a great deal of attention on attracting more visitors to parks and offering a broader range of visitor opportunities in parks as ways of building support for parks and protected areas in the future. However, there is little empirical evidence to guide park managers and policy makers on what kinds of activities/experiences will best connect people to nature in a way that will increase support for conservation. We conducted a review of the literature to identify what is known about the linkage between visitor experiences in parks and public support for conservation; identifying research gaps; and outlining a research agenda in order to build more robust evidence to guide park management. Five main themes and research needs were identified: barriers to park visitation, attitudes towards parks, sense of place, nature connectedness and meaningful nature experiences.

Key words: protected areas, visitation, sense of place, nature connectedness, management

INTRODUCTION

Parks and protected areas are reservoirs of biodiversity, provide critical refugia for species, allow for the provision of ecosystem services, provide carbon-storage to buffer the effects of climate change and offer myriad other ecological benefits. But parks and protected areas also support economic, social and cultural values – including providing nature-based recreation, tourism and education opportunities. In an increasingly urbanized environment, parks provide a touchstone to the natural world; they are important spaces for developing social capital and for building a culture of conservation among citizens.

Growing concern about our disconnect with nature

There is growing recognition of the individual and societal benefits to health and well-being from contact with nature and parks (Lopoukhine et al., 2014; Maller et al., 2008; Weiler et al., 2013; Zylstra, 2014), and concern about the growing disconnect between children (and adults) and the natural environment (Louv, 2008)¹.

Simultaneously, there is mounting scientific evidence that the ecological health of the planet is declining (IPCC, 2014) including the ecological integrity of parks and protected areas (Canadian Parks and Wilderness Society (CPAWS), 2013; OAGBC, 2010; Office of the Auditor General of Canada, 2013; Parks Canada Agency, 2011). As a result, connecting people to nature and building political support for parks and conservation issues have become priorities for park and conservation organizations.

Fear that disconnect will lead to a decline in support and visits to parks and protected areas

In numerous polls and nationwide surveys parks have, and continue to have, a valued place in the minds of Canadians and Americans (EnviroNics Institute, 2009; Hart Research Associates & North Star Opinion Research, 2012; Ipsos Reid, 2011). However, there is widespread concern that if the populace becomes disconnected from the natural environment, there will be a parallel decline in support for parks and protected areas and other conservation initiatives.

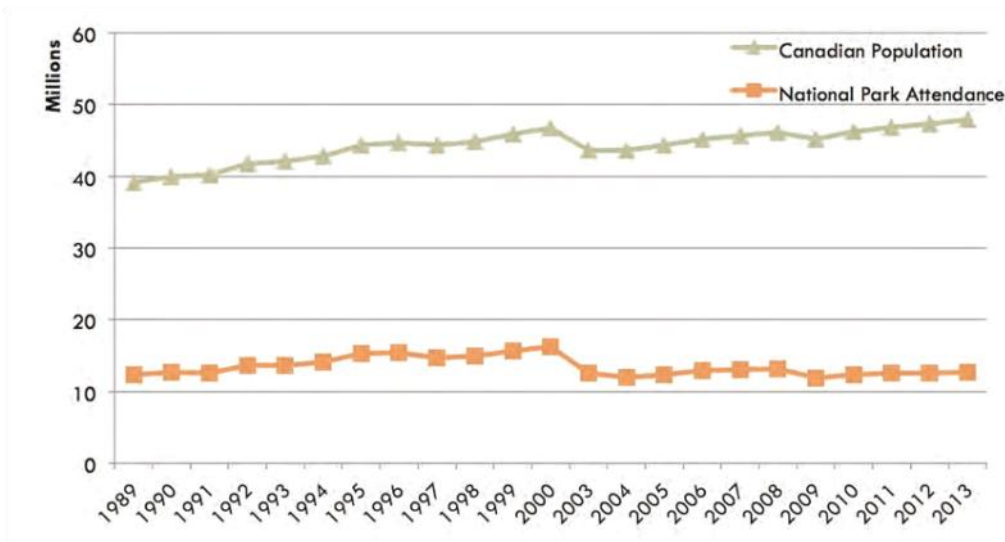


Figure 1. Visitation to Canadian National Parks 1989 to 2013. Note: Data for 2001 and 2002 was unavailable.

Source: Parks Canada Attendance 2008-2009 to 2012-2013; <http://www.pc.gc.ca/eng/docs/pc/attend/table1.aspx?m=1>

Within North America, visits to parks increased relatively steadily from their establishment through the 1980s with only minor variations linked to disruptive historical events such as World War II, economic depressions and recessions (Pergams & Zaradic, 2008). However, between the late 1980s and late 2000s, per capita visits to US and Canadian national parks declined. This decline in per capita parks visits has been relatively widespread across Canada and the US and there is some evidence, although not clear, that the trend reflects a broader decline in involvement in nature-based recreation (Balmford et al., 2009; Pergams & Zaradic, 2008). For provincial parks in Canada and state parks in the US, the trends are fairly similar (Shultis & More, 2011). Although day trips to some provincial parks have increased, overall visits to provincial parks in Canada have generally declined or are increasing below the rate of population growth.

Although there has been much hand wringing about these declines with fears that they are evidence of the nature disconnect, closer analysis of the data suggests parallels in the periods of decline coincident with economic recessions and social instability (e.g., post 9-11). In the last five years, actual visits to Canadian national parks have increased approximately 7 per cent (Figure 1) (Parks Canada Agency, 2013).

Limited evidence is available to inform the response

Many park agencies focus a great deal of attention on attracting more visitors to parks and offering a broader range of visitor opportunities in parks as ways of building support and revenues for parks and protected areas in the future². Some of the strategies being implemented

include diversifying the visitor experiences offered in parks, better connecting with urban communities, and attracting more diverse cultural groups to visit parks. However, there is very little empirical evidence to guide park managers and policy makers on what kinds of activities/experiences will best connect people to nature in a way that will increase support for pro-environmental behaviour and conservation initiatives over time. This is compounded by what Amend et al. characterize as ‘a growing gap between the formal conservation literature of academia...and the so-called “grey literature” of project reports, articles, NGO studies and working groups’ (Amend et al., 2014, p. 8).

This state-of-knowledge report was developed to respond to this information gap by reviewing what we know about the linkage between visitor experiences in parks and public support for conservation; by identifying research gaps in the area; and by outlining a research agenda to begin to address these gaps, in order to build more robust evidence to guide park management.

APPROACH

This state-of-knowledge (SOK) review summarizes an extensive literature about park visitation and nature connectedness, and how they relate to the goal of building a culture of conservation. It is not an exhaustive summary of all literature that is available, but is focused on synthesizing some of the core concepts in order to identify key findings and gaps to help guide further research and evidence-based decision-making.

This project was designed to address the issue within a North American, and specifically Canadian, context with a focus on natural parks and protected areas. Thus

national and provincial parks, as opposed to urban/city or historic parks are the focus. We were constrained by examining published work, in English. We are also cognizant that our report is framed from a Western and not an indigenous perspective. However, given that our review of literature was international in scope, we hope that some of this information may be useful beyond North America. Internationally, the healthy parks healthy people movement (see for example the foundational work by Maller et al., 2008) and urban parks initiatives (see for example Trzyna, 2014) frame these issues in a much broader context. We are indebted to those who have written some of the more comprehensive reviews of literature or critical papers that are at the core of this topic (e.g., Canadian Parks Council, 2014; Maller et al., 2008, Shultis & More, 2011; and Tam, 2012).

The findings are organized in five major subsections: 1) barriers to park visitation, 2) attitudes and the park experience, 3) sense of place, 4) nature connectedness, and 5) emotions and meaningful nature experiences. The paper concludes with the identification of a preliminary list of recommendations for further research.

BARRIERS TO PARK VISITATION

A decision to visit a park is a function of both interest and opportunity. For individuals, barriers (visitation constraints) to visiting parks are interpersonal (e.g., awareness/knowledge of parks, lack of interest in parks/park based activities, health concerns or limitations, lack of available time, fear); intra personal (e.g., family demands, social group constraints) or structural (e.g., cost, access difficulties, lack of equipment). This has been an area of significant research over the past 30 years.

Park agencies and advocacy groups often cite an increasingly urbanized, wired, aging and diverse population, along with other socio-demographic phenomena (Canadian Parks Council, 2014) as leading factors in declines in park visitation, empirical evidence that tests for these causes are largely lacking and correlational at best. In fact a recent meta-analysis of 22 North American studies of constraints to park visitation (including urban parks) found that time, cost and knowledge were the most significant constraints preventing people from visiting parks, followed by fear, health, location and access to transportation (Zanon et al., 2013). The types of facilities available and level of interest in parks were the lowest ranked constraints. Income and age had a strong influence on these constraints, followed by education, which had a moderate influence. Specifically, those with higher incomes and younger individuals most frequently cited

time as a key constraint, while those with lower incomes were more likely to report most other constraints (except facility availability and interest levels) as significant. Older park visitors were more frequently constrained by health and fear. Gender and race, in spite of much discussion to the contrary in public discourse, had relatively limited influence on constraints to park visits.

Those who are highly motivated to visit parks will find a way

There is relatively little research and empirical evidence on what strategies can be reasonably pursued to minimize constraints to visitation and whether those strategies will be effective. Recent research suggests that those who are highly motivated (Hubbard & Mannell, 2001; White, 2008) are likely to put more effort into overcoming barriers to pursuing leisure activities, including visiting parks, and that they will be more successful (Crawford et al., 1991; Hubbard & Mannell, 2001; Scott & Mowen, 2010). Increased awareness and information about parks and recreation opportunities, alleviation of safety concerns, and provision of transportation options (c.f. the Ontario, Canada, Parkbus programme www.parkbus.ca) are some of the strategies that have been evaluated and demonstrated some success in reducing visitation constraints (Scott & Mowen, 2010). In urban park contexts, recent research suggests that an individual's orientation towards nature is a stronger determination of park visits than proximity to green space (Lin et al., 2014). Recent research and recommendations by Trzyna and others (e.g., Trzyna, 2014, 2007) have identified challenges unique to urban protected areas and various strategies used throughout the world to help connect people to nature in urban areas.

Lack of interest and facilities are not key constraints

Although park visitation is often suggested to be declining because people are less interested in parks, evidence suggests that interest is the least important constraint influencing park visitation (Zanon et al., 2013). Similarly, evidence suggests that the number or type of facilities in parks is not a constraint to park visits.

ATTITUDES AND THE PARK EXPERIENCE

Within the context of park experiences and support for parks, our values, beliefs and attitudes affect all aspects of the dynamic between interest and understanding of parks, the decisions to visit parks, the types of experiences within the park, and the outcome of those experiences. Likewise, our experiences with and within parks may affect our values, attitudes, beliefs and behaviours towards them.



Children playing during the events for the release of the black-footed ferret (*Mustela nigripes*) at Grasslands National Park, Saskatchewan, Canada © WWF / Troy Fleece

Environmental values are enduring beliefs that express an end state preferred by individuals or societies (Rokeach, 1973). Values are abstract notions from which attitudes, and ultimately behaviours, might evolve. A worldview can be viewed as a framework for how we understand the world and it is built on these deeply held values. Attitudes rest on this foundation of values and are a collection of beliefs about a specific object or issue such as the environment or parks that includes cognitive (knowledge/fact), affective (feeling/emotion), and behavioural (intended actions) elements.

We bring our worldviews to the park

Our worldviews are based on deep and enduring value systems that are influenced by the sociocultural context in which we are born and raised. Research suggests that in large part our worldviews (e.g., environmental worldviews) are antecedent to the park visit and may predispose choices regarding the park visit (Lee & Moscardo, 2005). For example, a number of studies have shown that those holding more eco-centric attitudes (seeing oneself as being subject to nature rather than in control of it) are more likely to participate in nature appreciative activities while those holding more techno-centric attitudes (belief that humans have control over nature) are more likely to participate in motorized activities (Dunlap & Van Liere, 1978; Thapa, 2010).

Significant life events, particularly those that engender a strong level of emotional affinity, can help develop meaning from an experience and influence our worldviews. Thus while most typically our worldviews are set before we visit a park, a park experience may influence worldviews, particularly if it is a significant life event with a strong emotional component.

The linkage between attitude and behaviour

Attitudes are important to, and may predispose, behaviour (Stern et al., 1995) but there is a significant body of research that demonstrates that many people who hold a particular attitude don't exhibit corresponding behaviours. Numerous researchers note that the linkage between environment and park attitudes and behaviours is weak or modest (Cottrell, 2003; Scott & Willits, 1994; Tarrant & Cordell, 1997; Thapa, 1999, 2000), although the link between attitude and planned or intended behaviour is much stronger. In other words, people with positive attitudes towards environment and parks are likely to have good intentions about behaving in a way that supports environment and parks, but they may not actually follow through on these intentions. Attitudes are more likely to lead to positive behaviour if the behaviour is very easy, or if there is confidence that the actions will make a difference (Tarrant & Cordell, 1997).

Nature appreciative activities are linked to pro-environmental behaviours

The relationship between outdoor recreation participation and pro-environmental attitudes has been extensively studied. Early studies found mixed to weak support for the hypothesis that there is a strong relationship between outdoor recreation and environmental attitudes (Dunlap & Heffernan, 1975; Geisler et al., 1977; Jackson, 1986; Pinhey & Grimes, 1979; Van Liere & Noe, 1981). More recent research with improved methods (Teisl & O'Brien, 2003; Thapa, 2000, 2010; Thapa & Graefe, 2003) has demonstrated that participation in outdoor recreation results in a stronger relationship between attitudes and behaviours related to nature appreciation behaviours (Tarrant & Green, 1999; Thapa, 2010). Those who participate in nature-appreciative activities have a tendency towards stronger levels of environmental behaviours (e.g., green consumerism) than those who don't (Thapa, 2010)³. Evidence is also mounting that activities involving purposeful nature interactions, such as restoration activities (Ryan et al., 2001) or other nature-based activities (Vorkinn & Riese, 2001) are associated with increased concern about the health of a place.

Early exposure to nature builds strong connections

A strong body of research supports the notion that early exposure to nature helps children develop positive environmental attitudes and facilitates a sense of nature connectedness and likely support for conservation in later life (see for example Chawla, 1999). Key factors in childhood experiences include frequency of visits to green space, particularly wild nature; nature experiences that were accompanied and encouraged by trusted adults (e.g., parents); and experiences that are less structured and allow creative free play (Chawla, 1988, 1999; Tanner, 1980, 1998; Wells & Lekies, 2006). Childhood participation in 'wild nature', unstructured activities has a strong positive association with environmental behaviours in adulthood, in contrast to 'domesticated nature' (e.g., zoo visits, gardening, organized youth groups) experiences that are only weakly associated with pro-environmental behaviours (Wells & Lekies, 2006).

SENSE OF PLACE & PARKS

A strong sense of place may facilitate connections and conservation

Sense of place is a broad concept that refers to the meanings and attitudes we hold towards a particular locale. When a particular place (like a specific park) plays a key role in an individual's identity – in how the person defines themselves – it is referred to as place identity.

When we are reliant or dependent on a specific place (usually because of a particular activity), it is referred to as place dependence. Together, place identity and place dependence define our place attachment (Ramkissoon et al., 2012; Walker & Chapman, 2003).

A limited but growing body of research examines the relationships between sense of place and environmental behaviours (Gosling & Williams, 2010; Kelly & Bricker, 2000; Stokols & Shumaker, 1981; Walker & Chapman, 2003). Interacting with nature increases place attachment and willingness to engage in environmental behaviours (Scannell & Gifford, 2010). Some studies have found that those with strong place attachments to particular areas are more likely to act as resource stewards, to have more knowledge about the resource, and are less likely to engage in damaging behaviours (Wellman et al., 1982; Williams & Huffman, 1986). Recent studies within park contexts have supported the relationship between place attachment and conservation behaviours (Halpenny, 2006; Walker & Chapman, 2003). A study of place attachment to Point Pelee National Park (Canada) found that place attachment predicted place-related pro-environmental intentions. Place identity influences or controls the effects of place dependence in predicting pro-environmental intentions (Halpenny, 2010). There is evidence suggesting that more frequent park visits (Parks Canada, 2011) may correlate to stronger measures of place attachment; however, other research suggests non-park users can also develop a sense of place identity towards parks (Tuan, 1979). Some theorize that more frequent and longer visits may be important to developing a sense of place because they increase familiarity with the place and allow for potential integration of place identity (Tam, 2012; Williams & Vaske, 2003).

NATURE CONNECTEDNESS

Nature connectedness refers to the degree to which individuals include nature as part of their identity through a sense of oneness between themselves and the natural world (Dutcher et al., 2007; Schultz, 2002). Exploring individual differences in nature connection can potentially help foster the development of stronger human bonds with the natural world (Nisbet et al., 2011). People with high nature connectedness tend to have frequent, long-term contact with nature and spend the most time outdoors, exhibit ecologically aware attitudes and behaviours (Nisbet et al., 2009; Parks Canada, 2011; Wellman et al., 1982; Williams & Huffman, 1986), and be happier (Zelenski & Nisbet, 2014). Although a strong predictor of nature connectedness is time spent in the outdoors (Chawla, 1999) some research suggests that

general outdoor settings (as opposed to nature-focused/natural settings) do not result in an increase in connectedness (Bruni & Schultz, 2010). Some research suggests that wilderness, as opposed to developed or domesticated nature settings (Wells & Lekies, 2006), is more strongly related to creating nature connections, and likewise, settings such as hiking trails and beaches are more strongly related than golf courses and other built facilities (Schultz & Tabanico, 2007).

Cultivate nature connectedness and conservation through emotional nature experiences

Direct contact with nature and experiences with a strong emotional component are related to nature connectedness (Tarrant & Green, 1999). Although the study of nature connectedness is still in its infancy, there is evidence demonstrating that those who are more connected are more supportive of conservation, and that nature connectedness predicts environmental concern (Dutcher et al., 2007; Mayer & Frantz, 2004). Recent findings also suggest that at least in the context of urban parks, a sense of nature connectedness is a stronger determinant of park visitation than proximity to parks (Lin et al., 2014.). Ongoing research in Canada has found that the more connected one is to nature, the greater the motivation to visit parks, and the greater health benefits received from park experiences. This research has also found that nature connectedness is positively related to age, frequency of visits, life satisfaction, and perceived state of physical and mental health (Lemieux, 2015).

Intentional interactions with nature are the key to connectedness and action

Developing nature connectedness is not just a result of any time spent in nature; rather there is evidence that intentionality is critical. Interactions with nature vary from indirect experiences (e.g., looking at nature through a window or watching a movie), to incidental experiences (e.g., being physically present in nature but interacting with nature only as the unintended result of another activity such as cycling to work or downhill skiing in a park), to intentional experiences (e.g., intentionally interacting with nature such as by hiking in a park, viewing wildlife or gardening). Intentional interactions with nature have been identified as pivotal not only in the relationship to nature connectedness, but also critical to the relationship with responsible environmental behaviours (Keniger et al., 2013; Zylstra, 2014).

Nature connectedness is resistant to change but can be enhanced

Experimental research using nature interventions in non-park settings found that while nature connectedness, like other environmental attitudes, is deeply held it can

be enhanced with increased nature contact (Nisbet et al., 2011). Some research has examined the efficacy of specific interventions designed to improve nature connectedness (Chambliss, 2013; Ernst & Theimer, 2011; Gilbertson, 2013; Tam et al., 2013), but most studies were associated with interventions or experiences in counselling or educational settings. Other research has focused on probing the relationships between nature connectedness and altruism (Chochola, 2009), stewardship activities (Ford, 2008), meaning in life (Creedon, 2012), happiness (Cervinka et al., 2012), mental health (Tauber, 2012), environmental behaviour (Chochola, 2009; Hoot & Friedman, 2011) and other aspects, but there are relatively few examinations of nature connectedness in parks and protected areas.

Fostering restorative environments may hold promise

Research findings indicate that natural environments provide for 'soft fascination' experiences – that is experience where sounds, sights and smells attract our attention while still allowing us to function. There is evidence that these kinds of soft fascination experiences are more restorative by nature than hard fascination experiences such as participating in a sporting event or watching TV, which take our full attention and don't allow us to think, reflect and restore. There is potential to study the differences in park activities, and the settings in which they take place, based on the extent to which they provide soft fascination restorative environments (Kaplan, 1995; Olmsted, 1865). Initial research into the restorative functions of spending multiple days in natural environments away from technology have demonstrated not only the capacity to restore executive decision-making systems, but also showed promise in increasing creativity and problem solving (Atchley et al., 2012). Those who have stronger feelings of nature connectedness have also reported more positive emotions, vitality, enthusiasm, increased attention, and greater ability to focus on problems (Arnould & Price, 1993; Ryan et al., 2010). Related research on the notion of mindfulness (Kabat-Zinn, 2003) is focused on whether activities, particularly contemplative activities, will strengthen feelings of nature connectedness (Chambliss, 2013; Howell et al., 2013).

EMOTIONS AND MEANINGFUL NATURE EXPERIENCES

With the growing emergence of what has been called the 'experience economy', park agencies are moving beyond providing park experiences that are seen as merely satisfying or high quality, focusing instead on facilitating 'meaningful and memorable' experiences. Research



Tourists watching elephants cross a river in the Okavango Delta, Botswana © Equilibrium Research

addressing the nature of meaningful or memorable experiences provides some insight into what types of experiences may help visitors forge strong connections with nature.

Meaningful nature experiences result in increased personal and conservation benefits

Parks provide an opportunity for the public to have not just meaningful or memorable experiences generally, but meaningful nature experiences (MNE). To be meaningful, these experiences aren't just significant and emotional but they make an impact on an individual's life – what might generally be described as an 'aha' moment. Research suggests that MNEs can be triggered by encounters with wildlife or by spiritual or symbolic experiences (e.g., seeing signs of wildlife or patterns in nature) (McIntosh, 2012). MNEs have been described as

leading to increased awareness and sensory perceptions and to intense emotional experiences – often an increased sense of nature connectedness is the result (Zylstra, 2014). Benefits from these experiences include feelings of renewal, restoration, compatibility, connection and satisfaction (Kaplan & Kaplan, 1989; Morse, 2011). These kinds of experiences with high emotional involvement have also been identified as important to motivating environmentally responsible behaviours (Ballantyne et al., 2011; Chawla, 1999; De Wet, 2007; Kals et al., 1999). This connection between meaningful nature experiences and supportive conservation behaviours results from generating positive views of nature, increasing connectedness, and new ways of seeing and respecting nature. It has also been reported as influencing life paths like career choices (Zylstra, 2014).



Tourists observe a Southern right whale (*Eubalaena australis*) and her calf, Patagonia, Argentina © James Frankham / WWF

Emotions can charge the experience and amplify nature connectedness

Studies indicate that while attitudes are informed by knowledge they are driven by affect, or emotion. This suggests the importance of park experiences that move beyond an activity opportunity or the transmission of knowledge, to those that nurture an emotional connection to the park environment. At the core of much of this research is an examination of the importance of the emotional or spiritual connections that people have with the place (Arnould & Price, 1993), the natural environment, or other participants on the trip (Heintzman, 2012; Jefferies & Lepp, 2012; Stringer & McAvoy, 1992). However, in spite of the emphasis among park agencies on encouraging meaningful and memorable experiences that foster nature connectedness, there is still little information available to guide management in successfully connecting visitors with nature (Farber & Hall, 2007).

Emotions are critical in contributing to impactful or memorable experiences and in developing empathy towards the natural world, and thus are central to understanding nature connectedness and related outcomes such as support for parks (Kals et al., 1999; Nisbet et al., 2009; Vining, 1987). A significant body of literature points to the emotional connections between

humans and nature (Kals et al., 1999; Mayer & Frantz, 2004). Empathy towards nature and sense of place is correlated with responsible environmental behaviours (Walker & Chapman, 2003). Development of empathy is facilitated by positive experiences, particularly those that occur over a length of time, and sharing these experiences with others (Kals et al., 1999; McIntosh, 2012). So while there is a strong body of evidence that attributes significant benefits to visitors from even short visits to parks, longer visits that create opportunities for emotionally impactful experiences are more associated with nature connectedness and ultimately more likely to lead to environmentally responsible behaviours. And while frequency of time in nature, and time in nature between the ages of 7-12, have been identified as the most significant predictors of attitudes towards nature (Kals et al., 1999; Tanner, 1998), there is some suggestion that a meaningful nature experience itself can result in high nature connectedness (Zylstra, 2014).

Knowledge may not be king

Although park interpretive and educational programmes that focus on enhancing knowledge can be a valuable part of the park experience, information can, but does not always, affect attitudes or behaviours (Ham, 2007; Tubb, 2003). Some research has found that highly engaging, thought provoking and emotionally connected

activities may both reinforce existing attitudes and have the potential to help develop new attitudes or promote changes in park behaviours (Cacioppo & Petty, 1989; Werner et al., 1998). Preliminary research suggests that interpretive programmes can increase feelings of nature connectedness, particularly if they complement knowledge-based learning with emotional connections to nature or to place. However, research on the influence of interpretive programming on behaviours in natural areas is limited and lacks robustness (Munro et al., 2008; Weiler et al., 2013).

GAPS IN KNOWLEDGE AND AREAS FOR FUTURE RESEARCH

Although there is increasing interest in the issues of connecting people with nature and a growing body of research (see for example Maller et al., 2008), many significant gaps remain.

Barriers to visitation. Although there is much speculation, there is little empirical evidence investigating the barriers to park visitation – particularly in non-urban park settings. More research should be conducted to investigate barriers and the success of approaches used to overcome barriers. For example, is there a lack of interest in visiting parks among some segments of the population, and if so, why and for whom is lack of interest (as opposed to opportunity constraints) the driving reason behind the decision to not visit a park? Are increasing urbanization, aging populations and other social change phenomena associated with a lack of interest, or opportunity in park visits? Do recreational experiences in nature, particularly urban experiences, generate or maintain connectedness to nature; are urban park/nature experiences truly gateway experiences leading to other park visits?

Activities and infrastructure. Some protected areas agencies are responding to declines in visitation or concerns about connectedness by offering new activities and infrastructures that often challenge the norms of acceptable park based activities (e.g. Glacier Skywalk in Jasper National Park, AB, Canada). These activities are justified by claims of reaching underserved or non-traditional park audiences, disadvantaged audiences or providing opportunities to truly connect with nature but there is limited, if any, evidence to examine these claims. What audience is attracted (vs deterred) by new, built infrastructure based opportunities in parks; do these result in increases (and long-lasting increases) in visitation; do these activities provide opportunities for people to have meaningful nature experiences; what activities and settings facilitate connectedness to nature

in parks; and what park experiences are associated with the ‘intentional interaction’ with nature so important to nature connectedness?

Attitudes towards parks and nature. Continuing to build on research on the nature and role of attitudes about parks and conservation there is a need for empirical research (beyond simple polls) on a number of related topics including: the attitudes that visitors and non-visitors hold towards parks and how and when these attitudes are developed; the role park visits have in shaping or influencing environmental attitudes and worldviews and/or conversely the role existing environmental attitude and worldviews have in influencing park visits; how outdoor activities influence the relationship between attitude and behaviour within a park-type setting (with park-focused activities); and what park-specific appreciative attitudes and behavioural intentions do non-park visitors have and why.

Sense of place. More research is needed in our growing understanding of the relationship between parks and place attachment. For example studies that: explore the role of place-specific emotions and feelings (using in-depth/longitudinal measurements) and place identity in fostering pro-environmental behaviour; or investigate the relationship of place attachment to pro-environmental behaviour in park settings; and examining how place attachment can be strengthened?

Nature connectedness. In the new field of nature connectedness many questions remain including: how and why people have such varying levels of nature connectedness; whether nature connectedness relates to one’s motivation to visit parks; and how does nature connectedness relate to the benefits received from park experiences? Additionally, empirical evaluations are needed of programmes or experiences within or about parks designed to improve nature connectedness.

Culture of conservation. Finally, more research should be conducted to determine how to facilitate a culture of conservation and action among park visitors and the kinds of environmentally-responsible behaviours and park-supportive behaviours that can be facilitated.

CONCLUSIONS – THE OPPORTUNITY TO LEARN THROUGH PRACTICE

Park agencies, non-governmental organizations and others are engaged in a wide array of initiatives to try to better connect people to nature with, and within, parks. In Canada, outreach campaigns to new Canadians, the establishment of a new national urban park in Toronto,

learn-to-camp programmes and park volunteer programmes are just some of the new strategies being employed and organizations around the world are engaged in similar creative initiatives. An excellent opportunity exists to advance the state of knowledge and ultimately, practice. There is an opportunity to learn from the management actions undertaken by protected area agencies and others if they are structured within an adaptive management framework to support evidence-based research.

ENDNOTES

¹Some have critiqued this notion of a 'disconnect' as the privilege of more developed nations but initiatives to combat this issue are increasingly widespread as evidenced by 2007 initiatives by South African Parks (<http://www.sanparks.org/about/news/?id=622>) and widespread initiatives in China (<http://www.theguardian.com/environment/2012/jan/11/children-china-urban-jungle-nature>).

²For example, Parks Canada has formally set an objective of increasing visitation to national parks by 10 per cent between 2010 and 2015 (Parks Canada, 2010).

³Notably, this body of research did not take place in 'national park' type locations, suggesting a need to replicate these types of studies in park settings.

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REFERENCES

- Amend, T., Brooks, T., Choudhury, B. C., Coad, L., Dudley, N., Hockings, M., Kormos, C., Lopoukhine, N., Lotter, W., MacKinnon, K., Newing, H., Redford, K.H., Stolton, S. and Verschuuren, B. (2014). Publishing for the protected area community: a vision for PARKS from its editorial board. *Parks*. 20(2), 7–12. DOI: 10.2305/IUCN.CH.2014.PARKS-20-2.TA.en
- Arnould, E. J. and Price, L. L. (1993). River magic: extraordinary experience and the extended service encounter. *Journal of Consumer Research*, 20(1), 24. <http://dx.doi.org/10.1086/209331>
- Atchley, R. A., Strayer, D. L. and Atchley, P. (2012). Creativity in the wild: Improving creative reasoning through immersion in natural settings. *PLoS One*, 7(12), e51474. DOI: 10.1371/journal.pone.0051474
- Ballantyne, R., Packer, J. and Sutherland, L. A. (2011). Visitors' memories of wildlife tourism: Implications for the design of powerful interpretive experiences. *Tourism Management*, 32(4), 770–779. DOI: 10.1016/j.tourman.2010.06.012
- Balmford, A., Beresford, J., Green, J., Naidoo, R., Walpole, M. and Manica, A. (2009). A global perspective on trends in nature-based tourism. *PLoS Biology*, 7(6), e1000144. DOI: 10.1371/journal.pbio.1000144
- Bruni, C. M. and Schultz, P. (2010). Implicit beliefs about self and nature: Evidence from an IAT game. *Journal of Environmental Psychology*, 30(1), 95–102. DOI: 10.1016/j.jenvp.2009.10.004
- Cacioppo, J. T. and Petty, R. E. (1989). Effects of message repetition on argument processing, recall, and persuasion. *Basic and Applied Social Psychology*, 10(1), 3–12. DOI: 10.1207/s15324834basp1001_2
- Canadian Parks and Wilderness Society (CPAWS). (2013). *State of Canada's Parks Report 2013: One step forward/two steps back*. Ottawa, ON: CPAWS.
- Canadian Parks Council/Parks Canada. (2014). *Connecting Canadians with Nature — An Investment in the Well-Being of our Citizens*. Ottawa, ON: Parks Canada.

- Cervinka, R., Röderer, K. and Hefler, E. (2012). Are nature lovers happy? On various indicators of well-being and connectedness with nature. *Journal of Health Psychology*, 17(3), 379–388. DOI:10.1177/1359105311416873
- Chambliss, K. M. (2013). *Beholding Nature: Contemplation and Connectedness* (Ph.D.). Prescott College, United States - Arizona.
- Chawla, L. (1988). Children's concern for the natural environment. *Children's Environments Quarterly*, 13–20.
- Chawla, L. (1999). Life paths into effective environmental action. *The Journal of Environmental Education*, 31(1), 15–26. DOI: 10.1080/00958969909598628
- Chochola, L. J. (2009). *Exploring altruism as a possible moderator between connectedness to nature and pro-environmental behavior* (Ph.D.). Alliant International University, Los Angeles, United States - California.
- Cottrell, S. P. (2003). Influence of Sociodemographics and Environmental Attitudes on General Responsible Environmental Behavior among Recreational Boaters. *Environment and Behavior*, 35(3), 347–375. DOI: 10.1177/0013916503035003003
- Crawford, D. W., Jackson, E. L. and Godbey, G. (1991). A hierarchical model of leisure constraints. *Leisure Sciences*, 13(4), 309–320. DOI:10.1080/01490409109513147
- Creedon, M. A. (2012). *Connectedness to nature and its relationship to meaning in life* (Psy.D.). Massachusetts School of Professional Psychology, United States - Massachusetts.
- De Wet, B. (2007). *Influence of wilderness experience on the adoption of environmentally responsible behaviour* (MSc thesis). Stellenbosch University, Stellenbosch.
- Dunlap, R. E. and Heffernan, R. B. (1975). *Outdoor Recreation and Environmental Concern: An Empirical Examination*. *Rural Sociology*.
- Dunlap, R. E. and Van Liere, K. D. (1978). The 'New Environmental Paradigm': A proposed measuring instrument and preliminary results. *The Journal of Environmental Education*, 9(4), 10–19. DOI: 10.1111/0022-4537.00176
- Dutcher, D. D., Finley, J. C., Luloff, A. E. and Johnson, J. B. (2007). Connectivity with nature as a measure of environmental values. *Environment and Behavior*, 39(4), 474–493. <http://doi.org/10.1177/0013916506298794>
- Enviroics Institute. (2009). 2009 National Survey of Canadians. Retrieved from http://epe.lac-bac.gc.ca/100/200/301/pwgs-c-tpsgc/p-or-ef/parks_canada/2009/055-08-e/report.pdf
- Ernst, J. and Theimer, S. (2011). Evaluating the effects of environmental education programming on connectedness to nature. *Environmental Education Research*, 17(5), 577–598.
- Farber, M. E. and Hall, T. E. (2007). Emotion and environment: visitors' extraordinary experiences along the Dalton Highway in Alaska. *Journal of Leisure Research*, 39(2), 248–270.
- Ford, H. L. (2008). *Stewardship volunteers: Well-being and connectedness to nature through conservation work* (M.A.). Royal Roads University, Canada.
- Geisler, C. C., Martinson, O. B. and Wilkening, E. A. (1977). Outdoor recreation and environmental concern: a restudy. *Rural Sociology*, 42(2), 241–249.
- Gilbertson, E. (2013). *When nature speaks: Evoking connectedness with nature in children through role-play in outdoor programming* (Masters Thesis). Royal Roads University, Canada.
- Gosling, E. and Williams, K. J. H. (2010). Connectedness to nature, place attachment and conservation behaviour: Testing connectedness theory among farmers. *Journal of Environmental Psychology*, 30(3), 298–304. DOI: 10.1016/j.jenvp.2010.01.005
- Halpenny, E. A. (2006). *Environmental Behaviour, Place Attachment and Park Visitation: A case study of visitors to Point Pelee National Park*. (Ph.D.) University of Waterloo, Ontario, Canada.
- Halpenny, E. A. (2010). Pro-environmental behaviours and park visitors: The effect of place attachment. *Journal of Environmental Psychology*, 30(4), 409–421. DOI: 10.1016/j.jenvp.2010.04.006
- Ham, S. (2007). Can interpretation really make a difference? Answers to four questions from cognitive and behavioral psychology. In *Proceedings, Interpreting World Heritage Conference*, March (pp. 25–29).
- Hart Research Associates, & North Star Opinion Research. (2012). *Strong Bipartisan Support for National Parks*. Findings from a national survey conducted on behalf of The National Parks Conservation Association and National Park Hospitality Association. Retrieved from http://www.npca.org/assets/pdf/Survey_Findings_Memo_Final.pdf
- Heintzman, P. (2012). Spiritual Outcomes of Wilderness Experience: A synthesis of recent social science research. *PARKScience*, 28(3).
- Hoot, R. E. and Friedman, H. (2011). Connectedness and Environmental Behavior: Sense of Interconnectedness and Pro-Environmental Behavior. *International Journal of Transpersonal Studies*, 30(1/2), 89–100.
- Howell, A. J., Passmore, H.-A. and Buro, K. (2013). Meaning in Nature: Meaning in Life as a Mediator of the Relationship between Nature Connectedness and Well-Being. *Journal of Happiness Studies*, 14(6), 1681–1696.
- Hubbard, J. and Mannell, R. C. (2001). Testing Competing Models of the Leisure Constraint Negotiation Process in a Corporate Employee Recreation Setting. *Leisure Sciences*, 23(3), 145–163.
- IPCC. (2014). *Climate Change 2014: Impacts, Adaptation and Vulnerability*. IPCC Secretariat.
- Ipsos Reid. (2011). *Nine in Ten (87%) Canadians Say That When Connected to Nature They Feel Happier*.
- Jackson, E. L. (1986). Outdoor recreation participation and attitudes to the environment. *Leisure Studies*, 5(1), 1–23. DOI: 10.1080/02614368600390011
- Jefferies, K. and Lepp, A. (2012). An Investigation of Extraordinary Experiences. *Journal of Park & Recreation Administration*, 30(3).
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: past, present, and future. *Clinical Psychology: Science and Practice*, 10(2), 144–156. DOI: 10.1093/clipsy.bpg016
- Kals, E., Schumacher, D. and Montada, L. (1999). Emotional affinity toward nature as a motivational basis to protect nature. *Environment and Behavior*, 31(2), 178–202. DOI: 10.1177/00139169921972056
- Kaplan, S. (1995). The restorative benefits of nature: Toward an integrative framework. *Journal of Environmental Psychology*, 15(3), 169–182. DOI:10.1016/0272-4944(95)90001-2
- Kaplan, R. and Kaplan, S. (1989). *The experience of nature: A psychological perspective*. CUP Archive.
- Kelly S. and Bricker, D. L. K. (2000). Level of Specialization and Place Attachment: An Exploratory Study of Whitewater

- Recreationists. *Leisure Sciences*, 22(4), 233–257. DOI:10.1080/01490409950202285
- Keniger, L., Gaston, K. J., Irvine, K. N. and Fuller, R. (2013). What are the benefits of interacting with nature? *International Journal of Environmental Research and Public Health*, 10.
- Lee, W. H. and Moscardo, G. (2005). Understanding the impact of ecotourism resort experiences on tourists' environmental attitudes and behavioural intentions. *Journal of Sustainable Tourism*, 13(6), 546–565. DOI: 10.1080/09669580508668581
- Lemieux, C. J., Doherty, S.T., Eagles, P.F.J., Gould, J., Hvenegaard, G.T., Nisbet, E. and Groulx, M.W. (2015). *Healthy Outside-Healthy Inside: the human health and well-being benefits of Alberta's protected Areas – towards a benefits-based management agenda*. Canadian Council on Ecological Areas (CCEA) Occasional Paper No. 20. CCEA Secretariat, Ottawa, Ontario, Canada.
- Lin, B., Fuller, R., Bush, R., Gaston, K. J. and Shanahan, D. (2014). Opportunity or Orientation? Who Uses Urban Parks and Why. *PLoS One*, 9(1), 1–7. DOI: 10.1371/journal.pone.0087422
- Lopoukhine, N., Wheeler, K., Keenleyside, K., Charles, C., Koss, R. and Nicoll, R. (2014). Empowering the next generation to connect with nature: A global movement. *Parks*. 20 (2),49–60. DOI: 10.2305/IUCN.CH.2014.PARKS-20-2.NL.en
- Louv, R. (2008). *Last child in the woods: Saving our children from nature-deficit disorder*. Algonquin Books.
- Maller, C., Townsend, M., Henderson-Watson, C., Pryor, A., Prosser, L., Moore, M. and Leger, L. (2008). *Healthy parks, healthy people: The health benefits of contact with nature in a park context*. Deakin University and Parks Victoria.
- Mayer, F. S. and Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, 24(4), 503–515. <http://dx.doi.org/10.1016/j.jenvp.2004.10.001>
- McIntosh, D. (2012). Wildlife viewing in the mountain national parks of Canada: an experiential view (MA NRES). University of Northern British Columbia, Prince George, BC.
- Morse, M. (2011). River experience: A phenomenological description of meaningful experiences on a wilderness river journey. (Ph.D. Dissertation). University of Tasmania, Hobart.
- Munro, J. K., Morrison-Saunders, A. and Hughes, M. (2008). Environmental interpretation evaluation in natural areas. *Journal of Ecotourism*, 7(1), 1–14. DOI:10.2167/joe137.0
- Nisbet, E. K., Zelenski, J. M. and Murphy, S. A. (2009). The nature relatedness scale: Linking individuals' connection with nature to environmental concern and behavior. *Environment and Behavior*, 41(5), 715–740. DOI:10.1177/0013916508318748
- Nisbet, E., Zelenski, J. and Murphy, S. (2011). Happiness is in our nature: Exploring nature relatedness as a contributor to subjective well-being. *Journal of Happiness Studies*, 12 (2), 303–322.
- OAGBC. (2010). Conservation of Ecological Integrity in B.C. Parks and Protected Areas (Report 3). Retrieved from <http://www.bcauditor.com/pubs/2010/report3/conservation-ecological-integrity-bc-parks-protected>
- Office of the Auditor General of Canada. (2013). Report of the Commissioner of the Environment and Sustainable Development. Retrieved from http://www.oag-bvg.gc.ca/internet/English/parl_cesd_201311_07_e_38677.html
- Olmsted, F. L. (1865). The value and care of parks. Reprinted in R. Nash (Ed.), *The American environment: Readings in the history of conservation*.
- Parks Canada. (2011). The VALUE of Visiting National Parks. Social Science Branch (ERVE).
- Parks Canada Agency. (2011). State of Canada's Natural and Historic Places 2011. Ottawa, ON: Government of Canada.
- Parks Canada Agency. (2013). Parks Canada Attendance 2008-09 to 2012-13.
- Pergams, O. R. W. and Zaradic, P. A. (2008). Evidence for a fundamental and pervasive shift away from nature-based recreation. *Proceedings of the National Academy of Sciences*, 105(7), 2295–2300. DOI: 10.1073/pnas.0709893105
- Pinhey, T. K. and Grimes, M. D. (1979). Outdoor recreation and environmental concern: A reexamination of the Dunlap-Heffernan thesis. *Leisure Sciences*, 2(1), 1–11.
- Ramkissoon, H., Weiler, B. and Smith, L. D. G. (2012). Place attachment and pro-environmental behaviour in national parks: The development of a conceptual framework. *Journal of Sustainable Tourism*, 20(2), 257–276. <http://dx.doi.org/10.1080/09669582.2011.602194>
- Rokeach, M. (1973). *The nature of human values*. Free press.
- Ryan, R. L., Kaplan, R. and Grese, R. E. (2001). Predicting volunteer commitment in environmental stewardship programmes. *Journal of Environmental Planning and Management*, 44(5), 629–648.
- Ryan, R. M., Weinstein, N., Bernstein, J., Brown, K. W., Mistretta, L. and Gagné, M. (2010). Vitalizing effects of being outdoors and in nature. *Journal of Environmental Psychology*, 30(2), 159–168. DOI:10.1016/j.jenvp.2009.10.009
- Scannell, L. and Gifford, R. (2010). The relations between natural and civic place attachment and pro-environmental behavior. *Journal of Environmental Psychology*, 30(3), 289–297. DOI: 10.1016/j.jenvp.2010.01.010
- Schultz, P. W. (2002). Inclusion with Nature: The Psychology of Human-Nature Relations. In P. Schmuck and W. P. Schultz (Eds.), *Psychology of Sustainable Development* (pp. 61–78). Springer, USA.
- Schultz, P. and Tabanico, J. (2007). Self, Identity, and the Natural Environment: Exploring Implicit Connections With Nature1. *Journal of Applied Social Psychology*, 37(6), 1219–1247. DOI: 10.1111/j.1559-1816.2007.00210.x
- Scott, D. and Mowen, A. J. (2010). Alleviating park visitation constraints through agency facilitation strategies. *Journal of Leisure Research*, 42(4), 535–550.
- Scott, D. and Willits, F. K. (1994). Environmental Attitudes and Behavior: A Pennsylvania Survey. *Environment and Behavior*, 26(2), 239–260. DOI: 10.1177/001391659402600206
- Shultis, J. and More, T. (2011). American and Canadian National Park Agency Responses to Declining Visitation. *Journal of Leisure Research*, 43(1), 110–132.
- Stern, P. C., Dietz, T. and Guagnano, G. A. (1995). The New Ecological Paradigm in Social-Psychological Context. *Environment and Behavior*, 27(6), 723–743. doi: 10.1177/0013916595276001
- Stokols, D. and Shumaker, S. A. (1981). People in places: A transactional view of settings. In J. Harvey (Ed.), *Cognition, social behavior, and the environment* (pp. 441–488). Hillsdale, NJ: Erlbaum.
- Stringer, L. A. and McAvoy, L. H. (1992). The Need for Something Different: Spirituality and Wilderness

- Adventure. *Journal of Experiential Education*, 15(1), 13–20.
- Tam, J. (2012). *Fostering Connections between Youth and the Environment in British Columbia*. Institute for Resources, Environment and Sustainability, UBC.
- Tam, K.-P., Lee, S.-L. and Chao, M. M. (2013). Saving Mr. Nature: Anthropomorphism enhances connectedness to and protectiveness toward nature. *Journal of Experimental Social Psychology*, 49(3), 514–521. DOI: 10.1016/j.jesp.2013.02.001
- Tanner, T. (1980). Significant life experiences: A new research area in environmental education. *The Journal of Environmental Education*, 11(4), 20–24.
- Tanner, T. (1998). Choosing the right subjects in significant life experiences research. *Environmental Education Research*, 4(4), 399–417. DOI:10.1080/1350462980040404
- Tarrant, M. A. and Cordell, H. K. (1997). The effect of respondent characteristics on general environmental attitude-behavior correspondence. *Environment and Behavior*, 29(5), 618–637. DOI: 10.1177/0013916597295002
- Tarrant, M. A. and Green, G. T. (1999). Outdoor Recreation and the Predictive Validity of Environmental Attitudes. *Leisure Sciences*, 21(1), 17–30.
- Tauber, P. G. (2012). An exploration of the relationships among connectedness to nature, quality of life, and mental health (M.S.). Utah State University, United States - Utah.
- Teisl, M. F. and O'Brien, K. (2003). Who Cares and Who Acts? Outdoor Recreationists Exhibit Different Levels of Environmental Concern and Behavior. *Environment and Behavior*, 35(4), 506–522. DOI: 10.1177/0013916503035004004
- Thapa, B. (1999). Environmentalism: The Relation of Environmental Attitudes and Environmentally Responsible Behaviors Among Undergraduate Students. *Bulletin of Science, Technology & Society*, 19(5), 426–438. DOI: 10.1177/027046769901900512
- Thapa, B. (2000). The association of outdoor recreation activities and environmental attitudes and behaviors among forest recreationists (Ph.D). The Pennsylvania State University, University Park, PA.
- Thapa, B. (2010). The Mediation Effect of Outdoor Recreation Participation on Environmental Attitude-Behavior Correspondence. *The Journal of Environmental Education*, 41(3), 133–150. DOI:10.1080/00958960903439989
- Thapa, B. and Graefe, A. R. (2003). Forest Recreationists and Environmentalism. *Journal of Park & Recreation Administration*, 21(1), 75–103.
- Trzyna, T. (2007). *Global Urbanization and Protected Areas*. Sacramento, California: California Institute of Public Affairs.
- Trzyna, T. (2014). *Urban Protected Areas: Profiles and best practice guidelines*. Best Practice Protected Area Guidelines Series No. 22, Gland, Switzerland, IUCN.
- Tuan, Y.-F. (1979). *Space and place: humanistic perspective*. Springer.
- Tubb, K. N. (2003). An evaluation of the effectiveness of interpretation within Dartmoor National Park in reaching the goals of sustainable tourism development. *Journal of Sustainable Tourism*, 11(6), 476–498. DOI: 10.1080/09669580308667217
- Van Liere, K. D. and Noe, F. P. (1981). Outdoor recreation and environmental attitudes: further examination of the Dunlap-Heffernan thesis. *Rural Sociology*, 46(3), 505–513. DOI: 10.1177/105382590903200107
- Vining, J. (1987). Environmental decisions: The interaction of emotions, information, and decision context. *Journal of Environmental Psychology*, 7(1), 13–30. DOI: 10.1177/0013916592241001
- Vorkinn, M. and Riese, H. (2001). Environmental Concern in a Local Context: The Significance of Place Attachment. *Environment and Behavior*, 33(2), 249–263. DOI: 10.1177/00139160121972972
- Walker, G. J. and Chapman, R. (2003). Thinking Like a Park: The Effects of Sense of Place, Perspective-Taking, and Empathy on Pro-Environmental Intentions. *Journal of Park & Recreation Administration*, 21(4).
- Weiler, B., Moore, S. A. and Moyle, D. B. (2013). Building and sustaining support for national parks in the 21st century: Why and how to save the national park experience from extinction. *Journal of Park and Recreation Administration*, 31(2), 110–126.
- Wellman, J. D., Roggenbuck, J. W. and Smith, A. C. (1982). Recreation specialization and norms of depreciative behaviour among canoeists. *Journal of Leisure Research*, 14(4), 323–340.
- Wells, N. M. and Lekies, K. S. (2006). Nature and the Life Course: Pathways from Childhood Nature Experiences to Adult Environmentalism. *Children, Youth and Environments*, 16(1), 1–24.
- Werner, C. M., Rhodes, M. U. and Partain, K. K. (1998). Designing Effective Instructional Signs with Schema Theory Case Studies of Polystyrene Recycling. *Environment and Behavior*, 30(5), 709–735. doi: 10.1177/001391659803000506
- White, D. D. (2008). A structural model of leisure constraints negotiation in outdoor recreation. *Leisure Sciences*, 30(4), 342–359. DOI: 10.1080/01490400802165131
- Williams, D. R. and Huffman, M. G. (1986). *Recreation specialization as a factor in backcountry trail choice*. General Technical Report, Intermountain Research Station, USDA Forest Service, (INT-212), 339–344.
- Williams, D. R. and Vaske, J. J. (2003). The measurement of place attachment: Validity and generalizability of a psychometric approach. *Forest Science*, 49(6), 830–840.
- Zanon, D., Doucouliagos, C., Hall, J. and Lockstone-Binney, L. (2013). Constraints to Park Visitation: A Meta-Analysis of North American Studies. *Leisure Sciences*, 35(5), 475–493. DOI: 10.1080/01490400.2013.831294
- Zelenski, J. M. and Nisbet, E. K. (2014). Happiness and feeling connected: The distinct role of nature relatedness. *Environment and Behavior*, 46(1), 3–23. DOI:10.1177/0013916512451901
- Zylstra, M. (2014). Exploring meaningful nature experience connectedness with nature and the revitalization of transformative education for sustainability (Dissertation). Stellenbosch University, South Africa.

RESUMEN

Más allá de los innumerables valores ecológicos, económicos y culturales que ofrecen, los parques proporcionan un elemento fundamental para el mundo natural, y en una sociedad cada vez más urbanizada y ajetreada son espacios importantes para la consolidación del capital social y la construcción de una cultura de conservación entre los ciudadanos. Muchos organismos encargados de la gestión de parques están enfocados en atraer más visitantes a los parques y ofrecer una gama más amplia de oportunidades para sus visitantes en procura de apoyo para los parques y las áreas protegidas en el futuro. Sin embargo, hay pocas pruebas empíricas para orientar a los administradores de parques y los responsables políticos sobre los tipos de actividades/experiencias más indicadas para conectar a las personas con la naturaleza en procura de aumentar el apoyo a la conservación. Examinamos la literatura disponible para identificar lo que se sabe acerca de la vinculación entre las experiencias de los visitantes en los parques y el apoyo público a favor de la conservación, identificar las lagunas en materia de investigación, y esbozar una agenda de investigación con el fin de aportar pruebas más consistentes para orientar la gestión de parques. Se establecieron cinco temas principales y necesidades de investigación específicas: limitaciones para realizar visitas a los parques, actitudes hacia los parques, sentido de apego al lugar, conexión con la naturaleza, y experiencias estimulantes relacionadas con la naturaleza.

RÉSUMÉ

Au-delà des valeurs écologiques, économiques et culturelles multiples qu'ils fournissent, les parcs sont un reflet direct du monde naturel et, dans une société de plus en plus urbanisée et trépidante, ils constituent des espaces essentiels pour créer du lien social et pour bâtir une culture de conservation parmi les citoyens. De nombreux organismes responsables de parcs redoublent d'efforts pour attirer davantage de visiteurs et leur offrir un plus grand éventail de possibilités, cherchant à rallier davantage de soutien pour les parcs et les aires protégées dans le futur. Cependant, il y a peu de données empiriques pour aider les gestionnaires des parcs à déterminer quels types d'activités et d'expériences pourront mieux rapprocher les gens de la nature de manière à accroître leur soutien à la cause de la conservation. Nous avons effectué une recherche documentaire afin de déterminer ce que l'on sait du lien entre l'expérience des visiteurs dans les parcs et le soutien public à la conservation; d'identifier les lacunes dans les travaux de recherche réalisés à ce sujet; et d'élaborer un programme de recherche afin de constituer un dossier solide pour orienter les mesures de gestion du parc. Cinq grands thèmes et des pistes de recherche ont été identifiés: les entraves aux visites touristiques, les attitudes envers les parcs, le sentiment d'appartenance, le sentiment de connexion à la nature, et les expériences enrichissantes au sein de la nature.



PERCEPTIONS AND ATTITUDES OF LOCAL COMMUNITIES TOWARDS KAFUE NATIONAL PARK, ZAMBIA

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ABSTRACT

A questionnaire was administered to residents in three chiefdoms of Mumbwa Game Management Area (GMA) in Zambia with the intention of determining levels of awareness and knowledge of some of the neighbouring Kafue National Park's attributes as well as perceptions and attitudes towards the park. Our findings suggest that the local communities in Mumbwa GMA were relatively unaware of the park's attributes, despite their approval of its proclamation. Even though the majority of respondents (65.6 per cent) enjoyed friendly relations with the park authority, the general perception towards the park was that it was government property and had little to do with them. This is corroborated by the number of respondents (68.4 per cent) that had no reason to visit the park or felt barred from entering the park. A number of reasons accounted for this apathy. One is that there were very few benefits accruing to the local community directly from the park. Another factor was the mutual suspicion between park staff and the community. This is exacerbated by land disputes between the three chiefs in the GMA. These disputes were the result of land policies during the colonial and pre-colonial eras that led to forced migrations and reallocation of land in the eastern GMA. When dealing with issues around the park and conservation in Mumbwa GMA, it would be prudent to deal first with the land disputes between the different stakeholders.

Key words: Zambia, Kafue National Park, Game Management Areas, chiefdoms, protected area attributes

INTRODUCTION

Kafue National Park (KNP) is Zambia's largest national park covering an area of approximately 22,480 km². The park was first proclaimed in 1950 and attained its full status in 1972 under the National Parks and Wildlife Act (ZAWA 2010). Today KNP is managed by the Zambia Wildlife Authority (ZAWA), a statutory body established under the Zambia Wildlife Act No. 12 of 1998. Surrounding KNP are nine Game Management Areas (GMAs) namely: Mumbwa, Namwala, Nkala, Sichifulo, Bbilili, Mulobezi, Mufunta, Kasonso Busanga and Lunga Luswishi.

GMAs are category VI protected areas according to IUCN's Protected Area Management Categories. They were set aside principally to serve as buffer zones around national parks. It is in the GMAs where Community Based Natural Resources Management (CBNRM) programmes are advocated with the view to co-manage the wildlife resources and enhance community participation and benefit streams from wildlife (ZAWA

Act No 12 of 1998). Thus, GMAs are not only important reservoirs of the wildlife resources but are also the cornerstone in the implementation of the various strategies in wildlife management.

The manner in which communities in GMAs perceive national parks (and their wildlife resources) and respond to conservation in general is the result of a multitude of factors that include livelihood strategies, benefits and costs of living adjacent to the park, relationships with wildlife, relationships with wildlife managers, historical connections to the park and knowledge and awareness of the importance of the park and wildlife resources (Adams & Hulme, 2001; Gadd, 2005; McClanahan et al., 2005; Neumann, 1998; Shibia, 2010). The relationship between the people of Mumbwa GMA and nature has evolved dramatically since pre-colonial times. As in many parts of Africa the colonial era saw the separation of indigenous peoples from their resources (Barrow & Fabricus, 2002; Chipungu, 1992; Gibson, 1999; Hutton et al., 2005; Neuman, 1998). Zambians were forbidden to hunt and

fish under new game laws and traditional institutions that had evolved over time were fundamentally changed (Chipungu, 1992; Gibson, 1999; Marks, 2005). This exclusionary approach denied indigenous peoples' rights to use wildlife which had up to that point been used to solidify economic and political associations (Gibson, 1999). It also culminated in the establishment of 'Protected' Areas such as KNP.

The establishment of KNP led to the displacement of at least five chiefdoms, among them, Chief Kabulwebulwe of the Nkoya. He was told that his chieftainship would no longer be recognized if he did not move out of the park (Mwima, 2001). He was first relocated to Chief Moono's area but after conflicts between their two peoples was resettled in Chief Mulendema's area in 1974/75. Currently the Chief's Palace is about 10 km from Nalusanga gate, one of the main entrances to the park. Chief Kabulwebulwe and his people were not the only ones to relocate into and/or within Mumbwa GMA. Oral history of the Mulendema and Chibuluma chiefdoms indicate that both were also relocated from areas along the eastern boundary of KNP further east into Mumbwa GMA. Their relocation was the result of an agreement made between the chiefs and the government of Zambia in order to set aside land for tourism and create a buffer zone around the park. Subjects of the chiefs mentioned above are today the main inhabitants of Mumbwa GMA.

Later, institutions called Community Resource Boards (CRB) were established that allowed communities to participate in the management of wildlife resources and obtain benefits in GMAs. These institutions were established by an Act of Parliament (No. 12 of 1998) that also provided for the declaration and continuation of GMAs and their settlements. In Mumbwa GMA, three CRBs exist namely: Chibuluma, Kabulwebulwe and Mulendema. Patrons for each of the three CRBs are the Chiefs that reside within the GMA. The lowest institutional organs within a GMA are Village Action Groups through which various activities are carried out.

The general management of a GMA is guided by the provisions of management plans described in Part V of the Zambia Wildlife Act of 1998. It is in these plans that communities together with other primary stakeholders prescribe various land use options, and set aside land for wildlife management where consumptive and non-consumptive tourism may be conducted. In Mumbwa GMA, land set aside for wildlife management included Mumbwa West & East hunting blocks (Figure 1). In both hunting blocks, a tourism concession with a hunting outfitter exists, and revenues generated are shared equally with ZAWA and the community through its CRB

office. The equal sharing of revenue is premised on the fact that ZAWA together with the communities co-manage wildlife in the GMAs.

Even though community participation and co-management strategies are being implemented in the GMAs, local cooperation in controlling poaching in the park has so far been lacking. In fact, there appears to be active and/or passive support for perpetrators of illegal activities who are often times members of communities living in the GMA (Siamudaala et al., 2009). It is against this background that a study to assess the perceptions and attitudes of local communities towards KNP in Mumbwa GMA was undertaken. Local perceptions, knowledge, participation and relations with the communities are important in defining management strategies and improving conservation outcomes (Gadd, 2005; McClanahan et al., 2005; Ostrom, 1999).

Mumbwa GMA was selected as the study site because it has 10 per cent of the population living adjacent to the park but still has the highest number of caught poachers in KNP, accounting for 39.3 per cent of poachers between 2000 and 2006 (Siamudaala et al., 2009). Mumbwa GMA is also closest to Lusaka, the nation's capital city, which is a big market for illegal wildlife products.

MATERIALS AND METHODS

Study area

Mumbwa GMA is situated in Mumbwa district and covers an area of approximately 3,370 km². It was proclaimed a GMA in 1972 and is referred to as GMA No. 5. It shares a boundary with the KNP in the north and has 15 Village Area Groups (VAGs) spread across Mumbwa East in Mulendema, Chibuluma and Kabulwebulwe Chiefdoms. Village Action Groups (VAGs) are administrative units of the Community Resource Board. Based on the land use options assigned by the community, the GMA is divided into five different zones where only specified activities are conducted. This is illustrated in Figure 2.

Mumbwa GMA is defined as a prime hunting area where highly valued trophy species such as buffalo, lion and leopard are abundant (ZAWA, 2004). In terms of revenue generation, the GMA is ranked fifth of the 21 GMAs country-wide where trophy hunting occurs (Lewis & Alpert, 1996). This makes it an important revenue generator for both the local communities and ZAWA who each get 50 per cent of the hunting revenue. The total population in Mumbwa GMA is estimated to be 25,712 with the adult population comprising up to 48.7 per cent, juveniles or youths 28.8 per cent and infants 22.4 per cent (Ministry of Health, 2010).

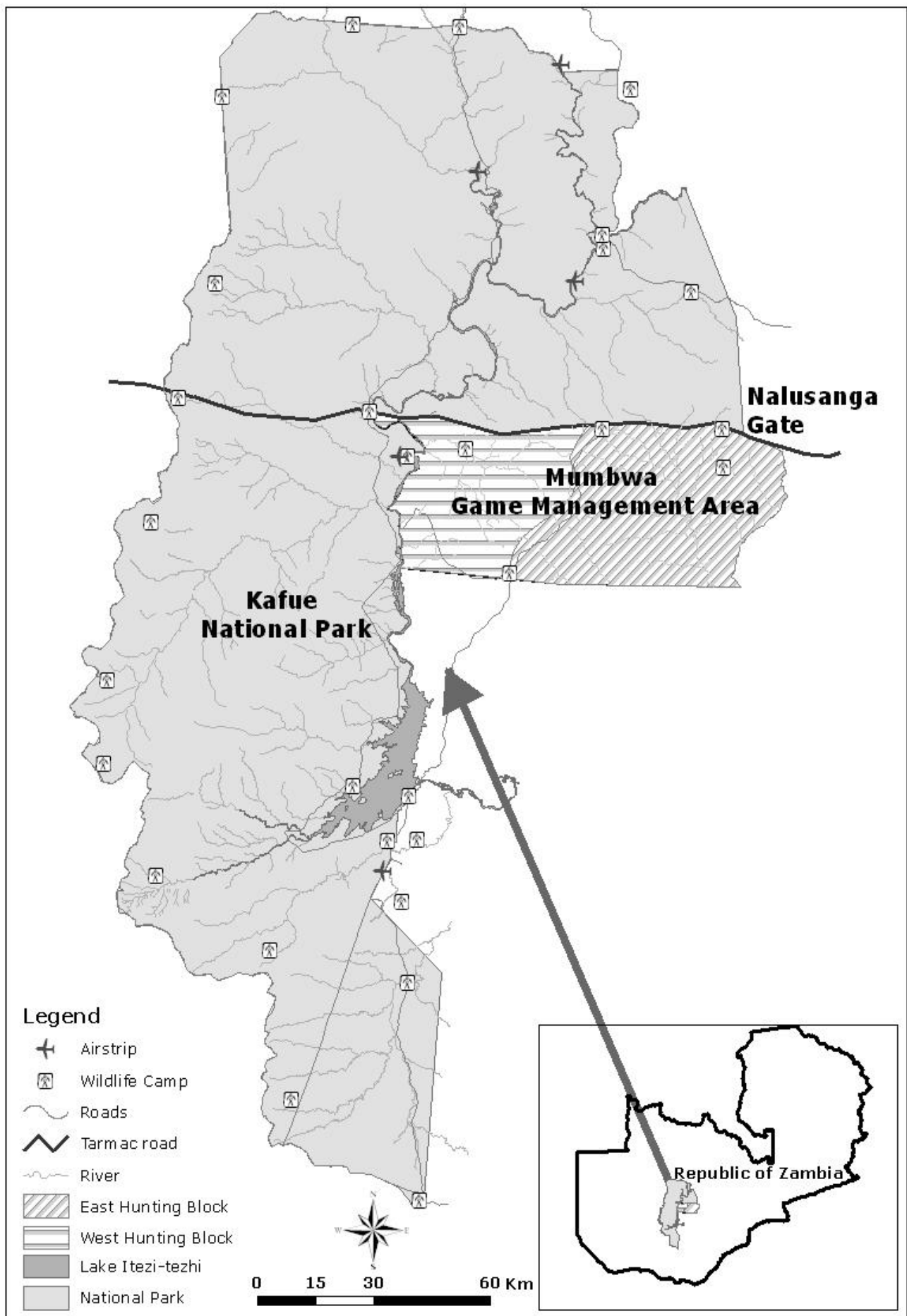


Figure 1: Map of Zambia showing Kafue National Park, Mumbwa GMA and its hunting blocks

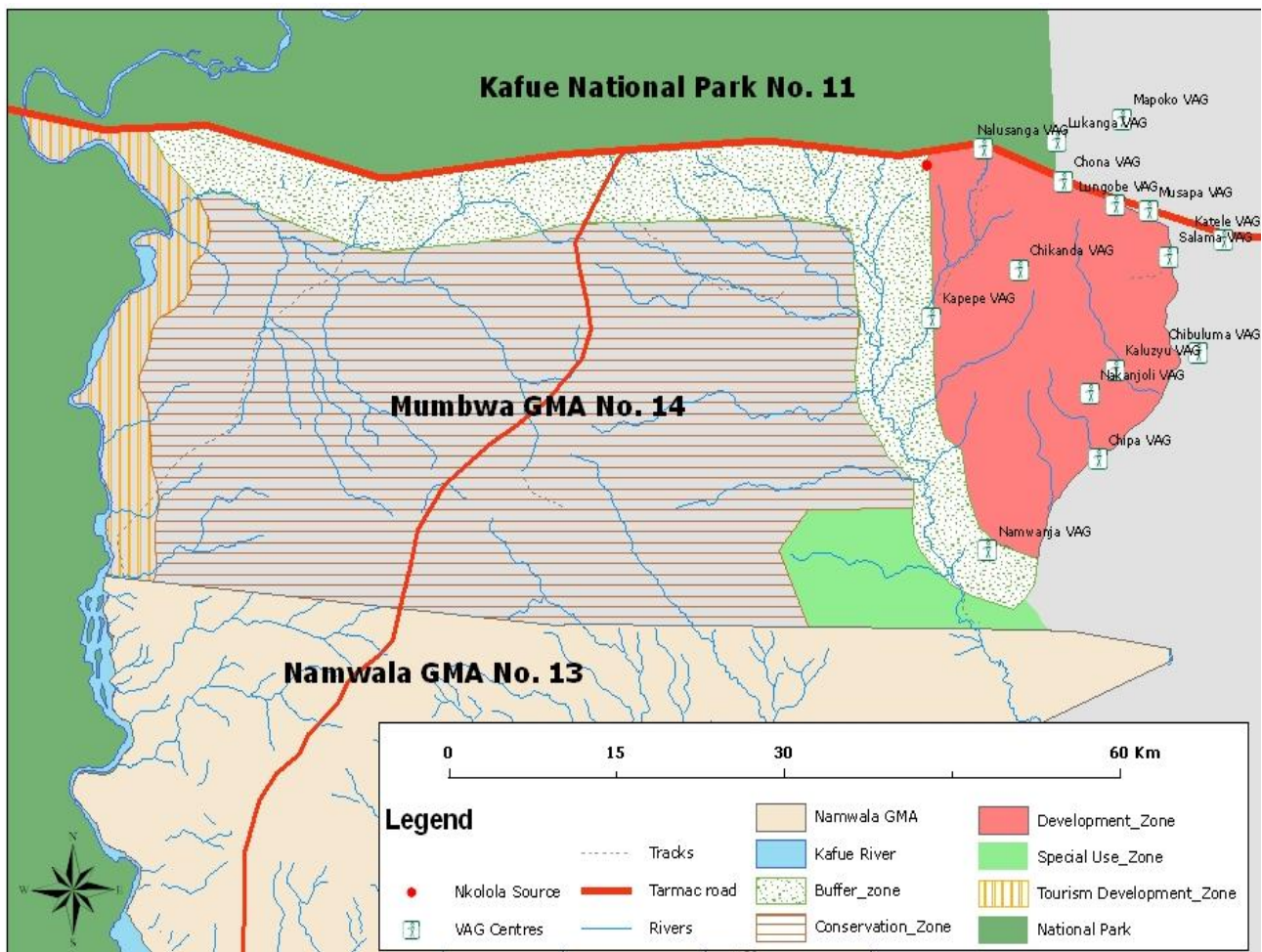


Figure 2: Spatial description of Mumbwa GMA, illustrating the location of VAG centres, land use zones and drainages. Source: ZAWA Maps, 2005

Data collection

We employed proportionate stratified sampling estimations described by Owen and Jones (1978) to determine sample sizes for each VAG. Samples were drawn according to the study’s interest groups that were categorized as adults (female & male) and juveniles/youth. In total 288 respondents were interviewed in all the 15 VAGs. A structured questionnaire was used to capture respondent’s socio-demographics looking at: their knowledge and awareness, perceptions (how individuals viewed issues) and attitudes (actions taken as a result of how they view issues) of KNP. The questionnaire included reliability questions that served to identify invalid or false responses.

Before data collection commenced the questionnaire was pre-tested. After the pre-test, some of the questions were rephrased to avoid distortion when translated into the local languages. Teachers from the local schools were employed as enumerators. Being fluent in Ila or Kaonde was a major requirement for all enumerators because these are the common languages spoken in this GMA. All the enumerators received a day of training on how to administer the questionnaire.

In addition to the questionnaire three focus group discussions with the youth, women and a mixed group of women and men were held at Chibuluma and Kabulwebulwe. This allowed interviewees to construct their own accounts of experiences to counter the limited explanatory power of structured questions. Each group comprised 7-10 individuals drawn from members of community clubs (women, youth, etc.) and institutions (church, schools, CRBs, etc.). Each discussion lasted for an hour and a half and discussions were premised on three major sections that sought to assess awareness/knowledge, perceptions and attitudes. Discussions were recorded on tape and were later transcribed onto data forms that categorized and grouped the responses. Responses were then compared considering the frequency of responses. Additionally notes were also taken during the discussions.

Data analysis

All responses to the questionnaire were collated using Microsoft Excel and Statistical Package for Social Sciences (SPSS version 17). A total of 110 variables were generated using SPSS and data were analyzed. Demographic data were analyzed by sex, marital status,



Fisherman and his catch on the Kafue River, Zambia © Martin Harvey / WWF

age, education, ethnicity and household size. Variables that indicated a respondent's wealth and income status included monthly income, housing structure and livestock. Responses were compared using frequencies and cross-tabulations in SPSS.

Five questions relating to some of the park's basic features (boundaries, institutional arrangements, knowledge of individuals punished for activities in the park, legal and illegal activities) were used to assess levels of awareness and knowledge of the park. Frequencies, cross tabulations and Chi-square analysis were used to compare statistical differences in responses among respondents. In order to obtain an overall result, Microsoft Excel was used to group and compare all negative responses, (responses that alluded to respondents not being aware or knowledgeable) versus positive responses that alluded to respondents being aware and knowledgeable.

With regards to perceptions towards the park, responses were considered from five questions relating to how respondents perceived the park's purpose, benefits, wildlife numbers and reasons to visit. Frequencies and

cross tabulations including Chi-square analysis were used to compare responses. An overall result was attained by grouping all negative responses and comparing them to positive responses (Fowler et al., 1998). The overall result concerning attitudes towards the park was attained by comparing pooled responses from four questions that solicited responses on attitudes, namely relations with ZAWA, adequacy of punitive measures, approval of the park's establishment by those present at the time and influence of the park on wildlife numbers in GMA.

RESULTS

Demographics of the respondents

Respondents came from the three chiefdoms and three Community Resource Boards (CRBs). The three chiefdoms were Chief Chibuluma of the Ila, Chieftainess Kabulwebulwe of the Nkoya people and Chief Mulendema of the Ila respectively. Among respondents the highest proportion were from the Tonga ethnic group (27 per cent) followed by Kaonde (23 per cent), Ila (21 per cent) and Lozi (10 per cent). The other 19 per cent consisted of at least 11 ethnic groups from all parts of Zambia as well as Shonas and Ndebeles from Zimbabwe.

Table 1: Demographics of respondents interviewed

Demographic aspects	Chiefdom		
	Chibuluma (n=121)	Mulendema (n=100)	Kabulwebulwe (n=67)
% respondents	42.4	34.7	22.9
Proportion of men to women	1.2 (67M:54F)	1.3 (57M:43F)	1.0 (34M:33F)
Modular household size	4-6	4-6	7-9
Modular monthly income (USD)	32-106	32-106	32-106
Average age	34±14.6	46±18.7	39±15.3
Highest level of education	Primary	Primary	Primary

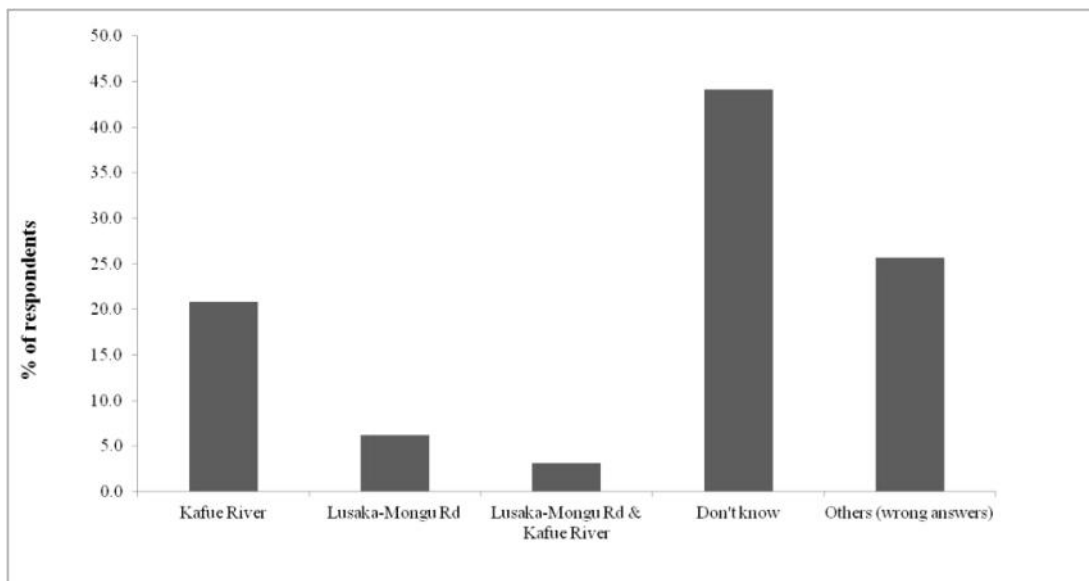


Figure 3: Respondents' description of KNP and Mumbwa GMA boundary

The majority (84 per cent) of respondents were farmers who reported farming as their sole occupation while less than one per cent were engaged in charcoal production. Another 4.5 per cent were high school students and less than one per cent combined farming with bee keeping. Another three per cent did some sort of trade or business as well as farming. Anecdotal evidence indicates that many residents of Mumbwa GMA are small to medium scale rather than subsistence farmers. Many fields observed were of cash crops such as cotton and high-value vegetables such as tomato which were reportedly sold at markets in Lusaka. Apart from crop farming, respondents also kept cattle, goats, chickens, pigs and sheep and in a few cases donkeys.

The fact that the majority of respondents (84 per cent) are small to medium scale farmers may have implications on conservation in the sense that it increases the likelihood of human wildlife conflicts (HWC), particularly due to crop raiding. Incidences of HWC are

likely to increase if land clearing for agriculture and settlements remains unchecked as wildlife corridors offered by the parks' buffer zones will be closed (Namukonde, 2009).

Basic demographic characteristics of the samples were similar for the three chiefdoms (Table 1). There were slightly more men than women, the highest level of education was typically primary school, and income figures indicate that the majority of respondents in Mumbwa GMA live on between USD 1 to just over 3 a day (Table 1) or USD 32 to 105.60 per month, which is higher than in many GMAs. Modular household size was largest in Kabulwebulwe and the average age was highest in Mulendema and lowest in Chibuluma. These values were not statistically significant from each other (i.e. $t_{stat} < t_{crit}$ $p=0.05$). According to Simasiku et al., (2008) 'the average annual per capita consumption (PCC) of communities living in GMAs and non-GMAs was ZMK 839,000 (approximately USD 250) and ZMK 850,000 respectively'.

Awareness and knowledge of key park attributes.

There is a lot of confusion about the boundary between the park and GMA. Nearly 70 per cent of respondents did not know the park boundary. Of those who knew, less than 4 per cent were aware about the whole boundary between the GMA and the park. Even the respondents that are involved in CBNRM are ignorant of the boundary, as there was no significant difference between their responses and those that were not involved in CBNRM ($\chi^2=0.081$, $df=1 > p=0.776$). Features that constitute the park and GMA boundary include the Kafue river on the western side of the GMA and the Lusaka-Mongu road in the north. Figure 3 illustrates the respondents' knowledge of the park and GMA boundary.

The question on the park boundary revealed land conflicts among chiefdoms as well as between the various chiefdoms and ZAWA. This study found that there was a great deal of tension among the chiefs and between the chiefs and ZAWA to the extent that conflict over land and in-migration has come to define the politics of Mumbwa GMA. Whenever they were first questioned about the park and its boundaries the majority of people in focus groups and among respondents to the questionnaire would revert to these disputes, talking about boundaries that were between disputed areas rather than boundaries between KNP and the GMA. The disputes involved land in the eastern portion of the GMA which had initially been set aside for hunting in the 1950s. Currently, Chief Mulendema is allowing new settlements in this area against the wishes of ZAWA. Other chiefs in the area feel that agreements made in the past are being abrogated and that their power is being usurped. Chieftainess Kabulwebulwe in particular has threatened to settle her own subjects in the area if the status quo continues.

With regards to management, the majority (88.5 per cent) of the respondents knew that ZAWA together with other government departments (Forestry, Lands and the CRBs) managed the park. Five per cent had no idea, while 2.1 per cent thought it was the CRB. While many respondents were correct about who managed the park, the fact that so few talked about the involvement of CRBs may indicate a lack of cooperation between the wildlife authorities and the community. It may also be a sign of weakness for CBNRM in Mumbwa GMA.

Despite the overwhelming number that knew which institution managed the park, very few (22.6 per cent) gave correct responses about the activities conducted in the park. Although local communities do not necessarily have an input in the day to day management of the park, their contribution towards conservation is considered significant as they are co-managers of buffer zones

situated in their areas. Some of these areas constitute important habitats as they serve as breeding grounds for a myriad of wildlife.

Local communities are seemingly more aware of illegal activities conducted in the park (88.9 per cent) as opposed to the legitimate activities. For instance, poaching, tree cutting and illegal fishing were the most frequently cited illegal activities in the park. This is corroborated by the number of respondents that felt that the wildlife in the park was decreasing due to poaching (45.5 per cent). Only 35.4 per cent felt that wildlife populations were increasing primarily due to protection from ZAWA. Similarly, there were more respondents aware of people that had been punished for illegal activities in the park (65.6 per cent) as opposed to those that had no idea (34.4 per cent). This level of awareness of illegal activities may serve as an indicator of local community involvement in illegal activities in the park. Nevertheless, of those that knew someone punished for illegal activities, 64 per cent were of the view that the meted punishments were fair; whilst 28 per cent thought they were too harsh and only 7.4 per cent thought they were not stringent enough.

Kabulwebulwe were seemingly more aware of the park attributes such as park boundary than the other two chiefdoms. However, amongst all respondents there was a significant association between awareness of park attributes and gender ($\chi^2=14.53$, $df=1 < p=0.05$), and age ($\chi^2=83.5$, $df=61 > p=0.05$) but not so, for average size of household ($\chi^2=5.69$, $df=5 > p=0.05$). This lack of awareness may be indicative of a lack of engagement of the community by the park authorities.

Perception of the park

Approximately 95 per cent of respondents felt that the purpose of the park was 'for keeping animals'. The general feeling seemed to be that the park was strictly for animals and in no circumstances could local people go there or else they would face some type of negative consequence. Of the 197 people who had not visited the park, 53 per cent 'had no reason to visit', 29 per cent could not afford park fees, 13 per cent said it was not allowed, and the rest did not have the means to visit the park.

With regard to benefits, 53.4 per cent of the respondents said they did not derive benefits from the park while 46.5 per cent said they derived benefits (Table 2). The most frequently perceived benefits were ecosystem services (60.6 per cent) that included among others the provision of honey, building materials and medicines. Income generation (26.4 per cent) from employment

Table 2: Respondents receiving benefits from park by chiefdom

Responses	Chibuluma	Mulendema	Kabulwebulwe	Total
No	95 (78.5%)	31 (31.0%)	28 (41.8%)	154 (53.4%)
Yes	26 (21.5%)	69 (69.0%)	39 (58.2%)	134 (46.5%)
Total	121 (100%)	100 (100%)	67 (100%)	288 (100%)

Table 3: ZAWA relations with chiefdoms in Mumbwa GMA

Attitude	Chibuluma	Kabulwebulwe	Mulendema	Total
Friendly	84 (68.3%)	40 (60.1%)	65 (65.0%)	189 (65.6%)
Depends on situation	0 (0%)	0 (0%)	3 (3.0%)	3 (1.0%)
No reaction	14 (11.4%)	2 (3.0%)	7 (7.0%)	23 (8.0%)
Unfriendly	25 (20.3%)	24 (36.4%)	25 (25.0%)	73 (25.4%)
Total	123 (100%)	66 (100%)	100 (100%)	288 (100%)

Table 4: Impacts of wildlife on livelihoods

Impact on livelihoods	Chibuluma	Mulendema	Kabulwebulwe	Total
Deprives access to land	14 (14.1%)	5(9.1%)	1(2.4%)	20 (10.3%)
Law enforcement operations	1(1.0%)	6(10.9%)	5(12.2%)	12 (6.1%)
Disease transmission	5(5.1%)	2(3.6%)	6(14.6%)	13 (6.7%)
Human wildlife conflict	79 (79.8%)	42 (76.4%)	31 (72.1%)	150 (76.9%)
Total	99 (100%)	55 (100%)	43 (100%)	195 (100%)

opportunities offered by tourism activities both in the park and GMA was the second most perceived benefit. Education (a result of schools built in the GMA) accounted for 13 per cent. Of the respondents who received benefits, 44 per cent were dissatisfied with them.

Analysis based on the chiefdoms revealed that a higher number of respondents from Mulendema perceived benefits from the park (69 per cent), followed by people from Kabulwebulwe (58.2 per cent) and Chibuluma (21.5 per cent). Chi-square analysis revealed a statistically significant association between chiefdom and the proportion of people who perceive benefits i.e. $\chi^2=21.776$, $df=2 > p=0.05$. Further, the focus group discussions revealed that Chibuluma residents felt they had less access to employment opportunities offered by the tourism industry and ZAWA. Chibuluma participants were also of the view that the people from Mulendema and Kabulwebulwe were better informed about jobs offered in the park and kept that information to themselves.

Analysis based on gender revealed that a higher number of men (53 per cent) perceived benefits than women (37 per cent) ($\chi^2=8.155$, $df=1 > p=0.004$). This response was expected in the Zambian traditional setting (Virtanen,

2003) as men would be the ones attending more meetings pertaining to resource allocation and hence are more likely to be in the CRB. Women’s participation in all three CRBs was overwhelmingly outnumbered by men; only 10 per cent of the 30 board members in the CRBs. It may be important to target women in order to ensure benefits get to the larger and most vulnerable group of people (Pitt et al., 2006). Overall, 78 per cent of respondents felt that there should be more benefits received from the park. Desired benefits were income generation opportunities which topped the list at 44 per cent of the respondents, followed by educational opportunities (27 per cent) and greater access to tourist facilities for employment (18.1 per cent).

Attitudes towards the park authority

Sixty to 70 per cent of respondents in each chiefdom described their relationship with the park authority as friendly. However, the frequency of friendly responses showed a highly significant departure from homogeneity between the three chiefdoms ($\chi^2=15.465$, $df=2 > p=0.05$). More respondents in Kabulwebulwe than in the other chiefdoms perceived relations as unfriendly (Table 3). This was not surprising considering there are far more village sweeps (house to house searches carried out by ZAWA) in Kabulwebulwe as opposed to the other two chiefdoms [Nguileka, pers. Comm. 2010]. Residents of

Kabulwebulwe themselves admitted to the area being a hotbed for poaching. The highest perceived negative impact was HWC which accounted for over 75 per cent of all responses (Table 4). Despite being further away from the park, 79.8 per cent of respondents from Chibuluma reported this as the major impact from the park's existence.

When asked, 'Do you approve of the park's proclamation' 90 per cent of respondents said yes. This is a paradox given the general lack of awareness. Further, investigation during focus group discussions and interviews with key informants indicated that locals acknowledged that KNP was an important national asset rather than local asset.

DISCUSSION

Although the local people seemed to acknowledge the park's existence, very few were aware of some of the park's attributes and felt barred and excluded from the park. This exclusion can be traced back to the history of forced migrations since colonial times (Chipungu, 1992; Gibson, 1999; Mwima, 2001; Neumann, 1998) and the later development of tourism and hunting industries (Hutton et al., 2005; Neumann 1998). It may also be a result of relationships between Mumbwa GMA communities and the KNP. This relationship presents an important paradox for both the community and ZAWA. On the one hand the communities are still excluded from the day to day management of the park and on the other hand they are expected to cooperate with park authorities to conserve the park. The challenge for ZAWA is achieving conservation objectives while at the same time not alienating the community.

Nevertheless simply engaging stakeholders is not enough. In Mumbwa GMA it is important to acknowledge the heterogeneity of residents that has come about through in-migration. In more recent years, Mumbwa GMA has received a high influx of migrants in search of farm land, mainly from Tonga, Kaonde and Lozi ethnic groups (ZAWA, 2012). Migrant groups as it were, may not necessarily appreciate the historical and cultural values attached to ancestral lands in the park, which according to Ajzen and Fishbein (1980) play a cardinal role in shaping attitudes. That is not to say that 'indigenous' ethnic groups automatically have a greater appreciation for nature or have a natural inclination to conserve. The adoption of values is highly complex, and conservationists should not take a simplistic model of a 'knowledge gap' in efforts to educate communities about conservation and bring them to their way of thinking (Adams & Hulme, 2001).

The fact that very few benefits accrue to the local community directly from the park could prove a real challenge since emphasis on the current CBNRM discourse is on benefits linked to income rather than intrinsic values of the park as the rationale for conserving (Hutton et al., 2005; Virtanen, 2003). This emphasis is counterproductive as long as communities continue to see minimal benefits. It is highly unlikely that the park will generate enough revenue in the short to medium term to support management objectives as well as provide for communities adjacent to the park. At the moment revenues generated from both consumptive and non-consumptive tourism only cover a third of the annual running costs of KNP (ZAWA, 2007; 2008; 2009). Further, population growth means that 'conservation strategies dependent on revenue sharing for their success will be vulnerable to declines in the relative size of the revenue pot' (Adams & Hulme, 2001).

Another challenge related to benefits is that respondents tended to discuss benefits at a community level and do not see benefits accruing to themselves personally. Also, the form in which the gains are distributed in a community may create challenges since wildlife conservation projects do not often provide essential goods or regular income for many community members (Virtanen, 2003). Simasiku et al. (2008) found that 'there was no evidence of welfare gains to the poorer households associated with living in the GMAs or participation in CRB/VAGs. Rather, the top 40 per cent of the households derive all the benefits from living in GMAs and participating in CRB/VAGs'. However, the poor are generally more dependent on ecosystem services, even though in quantitative terms wealthier members of the community are often the most significant users (Virtanen, 2003). This underscores the need to target other lower income groups particularly women who are currently under represented and the most disadvantaged. When women are involved benefits accrue more directly to households. There might also be opportunities for conservation friendly entrepreneurship. Thus far, CBNRM based on consumptive use of large mammals has been designed and implemented as a male oriented activity (Hunter et al., 1990). Women are nevertheless part of the decision-making process for natural resource utilization particularly at household level and their inclusion is important for the success of any conservation effort (Hunter et al., 1990).

Appreciation of a feature is often determined by the level of knowledge and awareness of it. Ignorance expressed may be interpreted to mean very little or no value attached. Our findings suggest that very few people are aware of the park's attributes such as the park's



Fisherman selling his freshly caught fish along the Kafue River, Zambia © Martin Harvey / WWF

boundary, which is a major concern. It is unlikely that the locals would help police the national park, let alone avoid entering and collecting resources from the park, if they are unsure of the park boundaries. This unwillingness to acknowledge the park boundary can also be attributed to, disagreements on the part of local communities as to where the boundary should be and whether or not they have the right to collect resources from the park. Ostrom (1999) described the clear definition of boundaries known to all stakeholders as a necessary attribute of a successful management institution that involves local communities. This is especially pertinent in light of the current and historic conflicts over land.

Relations between park management and the local communities impacts attitudes towards the park. As revealed by this study, the current relations between the community and park authority are generally good, given that 65.6 per cent of the respondents described their relations as friendly. However, there is still room to improve relations, given that Mumbwa GMA accounts for nearly 40 per cent of illegal activities in KNP (Siamudaala et al., 2009). This means that not all cases of illegal activities by both the residents of the GMA and those from other areas are reported, to the detriment of conservation. Strengthening good working relationships between ZAWA and local communities through dialogue would go some way in contributing positively towards building trust. However, good working relationships are

not built overnight. A long-term view must be taken and success must be defined by all stakeholders not just park managers.

CONCLUSION

KNP is a national asset which brings returns at national level. It is also important for conservation of unique biodiversity. However, there are many costs yet few benefits for people living adjacent to the park. Communities adjacent to the park are excluded from it to the extent that the majority think that it is illegal even to visit. The study findings suggest a need to strike a delicate balance between education, legal and policy instruments as well as participatory approaches. ZAWA needs to take on a more rigorous approach in engaging local communities through awareness and education programmes as well as improving access to the park. There should be a deliberate long-term approach to this.

The need to secure long-term provisions for funding aside from park and hunting revenue cannot be over emphasized. This will help secure livelihoods in the GMAs that would offer viable alternatives to undertaking illegal activities in the park. Further, conflict resolution strategies must be employed in order to mitigate the current land disputes that have taken centre stage in Mumbwa GMA. This threatens to undermine even the minimal benefits that the people receive from wildlife. It is also likely to spread into the KNP in a significant way if it remains unchecked.

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REFERENCES

- Adams, W.M. and Hulme, D. (2001). If community conservation is the answer, what is the question? *Oryx*, 35 (3): 193–200. DOI: 10.1046/j.1365-3008.2001.00183.x
- Ajzen, I. and Fishbein, M. (1980). *Understanding attitudes and predicting social behaviour*. Englewood Cliffs: Prentice-Hall.
- Barrow, E. and Fabricus, C. (2002). Do rural people really benefit from protected areas – rhetoric or reality? *PARKS*, 12(2): 67–77.
- Chipungu, S.N. (1992). *Guardians in their time: Experiences of Zambians under colonial rule*. London: Macmillan.
- Gadd, M.E. (2005). Conservation outside of parks: Attitudes of local people in Laikipia, Kenya. *Environmental Conservation*, 32(1): 50–63. <http://dx.doi.org/10.1017/S0376892905001918>
- Gibson, C. (1999). *Politicians and poachers: The political economy of wildlife policy in Africa*. Cambridge: Cambridge University Press.
- Fowler, J., Cohen, L. and Jarvis, P. (1998). *Practical statistics for field biology*. Chichester: John Wiley & Sons.
- Hunter, M.L., Hitchcock, R.K. and Wyckoff-Baird. (1990). Women and wildlife in Southern Africa. *Conservation Biology*, 4(4): 448–451. DOI: 10.1111/j.1523-1739.1990.tb00321.x
- Hutton, J., Adams, W.M. and Murombedzi, J.C. (2005). Back to the Barriers? Changing Narratives in Biodiversity Conservation. *Forum for Development Studies*, 32(2): 341–370. DOI: 10.1080/08039410.2005.9666319
- Lewis, D.M. and Alpert, P. (1996). Trophy hunting and wildlife conservation in Zambia. *Conservation Biology*, 11(1): 59–68. <http://www.jstor.org/stable/2387276>
- Marks, S. (2005). *Large mammals and a brave people: Subsistence hunters in Zambia*. London: Transaction Publishers.
- McClanahan, T., Davies, J. and Maina, J. (2005). Factors influencing resource users and managers' perceptions towards marine protected area management in Kenya. *Environmental Conservation* 32(1): 42–49. <http://dx.doi.org/10.1017/S0376892904001791>.
- Ministry of Health. (2010). *Village Population Summary–Mumbwa Rural Health Centers*. Mumbwa: Ministry of Health.
- Mwima, H.K. (2001). A Brief History of Kafue National Park, Zambia. *Koedoe*, 44(1): 57–72.
- Namukonde, N. (2009). *A checklist of fauna in Mumbwa Game Management Area*. Mumbwa: Zambia Wildlife Authority.
- Neumann, R. (1998). *Imposing wilderness: Struggles over livelihood and nature preservation in Africa*. London: University of California Press.
- Ostrom, E. (1999). *Self Governance and Forestry*. Jakarta: Centre for International Forestry Research.
- Owen, F. and Jones, R. (1978). *Statistics*. London: Butler & Tanner Ltd.
- Pitt, M.M., Khandker, S. R. and Cartwright, J. (2006). Empowering women with micro finance: Evidence from Bangladesh. *Economic Development and Cultural Change*, 54(4): 791–831. <http://dx.doi.org/10.1086/503580>.
- Shibia, G.M. (2010). Determinants of attitudes and perceptions on resource use and management of Marsabit National Reserve, Kenya. *Journal of Human Ecology*, 30(1): 55–62.
- Siamudaala, V., Nyirenda, V. and Saiwana, L. (2009). *Effectiveness of Law Enforcement on Wildlife Crimes in the Kafue Ecosystem in Zambia*. Lusaka: Zambia Wildlife Authority.
- Simasiku, P., Simwanza, H.I, Tembo, G., Bandyopadhyay, S. and Pavy, J.M. (2008). *The impact of wildlife management policies on communities and conservation in Game Management Areas in Zambia*. Lusaka: Natural Resource Consultative Forum.
- Virtanen, P. (2003). Local management of global values: Community-based wildlife management in Zimbabwe and Zambia. *Society & Natural Resources* 16(3): 179–190. DOI: 10.1080/08941920309164
- ZAWA, (2004). *Quota setting and monitoring of hunting manual*. Lusaka: Zambia Wildlife Authority.
- ZAWA, (2007). *Financial Management Reports for Kafue National Park*. Lusaka: Zambia Wildlife Authority.
- ZAWA, (2008). *Financial Management Reports for Kafue National Park*. Lusaka: Zambia Wildlife Authority.
- ZAWA, (2009). *Financial Management Reports for Kafue National Park*. Lusaka: Zambia Wildlife Authority.
- ZAWA, (2010). *Kafue National Park General Management Plan 2011–2020*. Lusaka: Zambia Wildlife Authority.
- ZAWA, (2012). *January to December 2012 Report – Kafue National Park*. Mumbwa: Zambia Wildlife Authority.

RESUMEN

Se aplicó un cuestionario a los residentes de tres territorios administrados por jefes tribales del Área de Manejo de Caza de Mumbwa (GMA) en Zambia con el fin de determinar los niveles de sensibilización y conocimiento de algunos de los atributos del vecino Parque Nacional Kafue, así como las percepciones y actitudes con respecto al parque. Nuestros hallazgos sugieren que las comunidades locales en la GMA de Mumbwa eran poco conscientes de los atributos del parque, pese a haber aprobado su proclamación. Al margen de las relaciones amistosas de la mayoría de los encuestados (65,6 por ciento) con la autoridad del parque, la percepción general en torno al parque era que este era propiedad del gobierno y tenía poco que ver con ellos. Esto es corroborado por el número de encuestados (68,4 por ciento) que no veía razón alguna para visitar el parque o sentía que tenía prohibida la entrada al parque. Esta apatía se debía a varias razones. Una es los pocos beneficios que la comunidad local recibe directamente del parque. Otro factor es la desconfianza mutua entre el personal del parque y la comunidad. Ello se ve agravado por las disputas de tierras entre los tres jefes de la GMA. Estas disputas tienen su origen en las políticas agrarias de la era colonial y pre colonial que condujeron a migraciones forzadas y la reasignación de tierras en la GMA oriental. Al abordar cuestiones relativas al parque y la conservación en la GMA de Mumbwa, sería prudente ocuparse primero de las disputas de tierras entre los diferentes grupos de interés.

RÉSUMÉ

Un questionnaire a été distribué aux résidents de trois chefferies dans la zone de Gestion des Animaux de Mumbwa (GAM) en Zambie, avec l'intention de déterminer leur niveau de sensibilisation et leur connaissance des particularités du Parc National de Kafue voisin, ainsi que leur perception et leur attitude envers le parc. Nos résultats indiquent que les communautés locales sont relativement peu au courant des particularités du parc, en dépit de leur approbation de sa création. Même si la majorité des répondants (65,6%) entretient des relations amicales avec les autorités du parc, il subsiste une perception générale que le parc est la propriété du gouvernement et n'a donc que peu à voir avec eux. Ceci est corroboré par une majorité de répondants (68,4%) qui ne voient aucune raison de visiter le parc ou qui pensent que son entrée leur est prohibée. Plusieurs raisons expliquent cette apathie. D'une part la communauté locale voit très peu d'avantages provenant directement du parc. D'autre part une suspicion mutuelle existe entre le personnel du parc et de la communauté. Cette situation est aggravée par des conflits fonciers entre les trois chefs de la zone. Ces litiges sont le résultat de politiques foncières au cours de l'ère coloniale et précoloniale qui ont conduit à des migrations forcées et à la réaffectation des terres dans la partie orientale de la région. Il est donc important de rappeler que des questions autour du parc et de la conservation dans la zone de Gestion des Animaux de Mumbwa doivent d'abord traiter les conflits fonciers entre les différentes parties prenantes.



INSTITUTIONAL ANALYSIS OF MULTI-LEVEL COLLABORATIVE MANAGEMENT IN PERIYAR TIGER RESERVE, SOUTHERN INDIA

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ABSTRACT

There are few cases where institutional mappings of multi-level arrangements for collaborative management have been conducted. If at all documented, these experiences remain unevaluated. Periyar Tiger Reserve in the Southern Western Ghats is a well-resourced government-managed protected area that extends management interventions into the buffer zone. It has been designated as a Learning Centre of Excellence by the Government of India, and recognized internationally for effective management. This paper analyses the institutional arrangements of this reserve at different levels, from the landscape level to the individual village. The analysis reveals that a multi-stakeholder collaborative management body appears to be important to supervise landscape protected area management. The establishment of the Periyar Foundation, a dynamic Government-Organized Non-Government Organization (GONGO), is particularly innovative to facilitate flexible management responses, which has been replicated nationwide through the National Tiger Conservation Authority. The protected area management tasks are well-defined, with protected area management working groups established for four key fields of management, increasing constructive engagement with all priority stakeholders. However, the representation of protected area working group spokespersons on the landscape collaborative management body seems to be weak. These specialized working groups engage the 72 villages, 5,584 households and 28,000 villagers, through 76 eco-development committees. Institutional mapping of multi-level collaborative management shows promise for further investigation in landscape protected area management.

Key words: collaborative management, eco-development committee, government-managed protected area, protected area management tasks, protected area working groups

INTRODUCTION

During recent decades, there has been a rapid development of protected area management approaches, resulting in two alternative and sharply contrasting approaches. The 'fortress conservation' approach focuses investments on protection measures and largely excludes the economic and development aspirations of the local people (Terborgh et al. 2002; Sanderson & Redford, 2003). However, these enforcement investments are relatively costly, requiring fairly intensive, long-term funding commitments with no social benefits. They may also lead to social conflict and non-compliance with conservation-related regulations (Romero & Andrade, 2004; Robbins et al., 2006), and lose both local political and social support. In the absence of social fencing involving local informants in the buffer zones, notable declines in targeted large mammals have occurred from commercial poaching (Corlett, 2007).

The alternative approach takes account of the needs of communities and stakeholders within the broader social-ecological landscape, through buffer zone management (Wells et al., 1992; Ebregt & De Greve, 2000), integrated conservation and development (Hughes & Flintan, 2001) and collaborative management (Borrini-Feyerabend et al., 2004); all focus on local communities while aiming to conserve biodiversity within reserves. However, a number of reviews of integrated conservation and development projects (ICDPs) suggest that they have largely failed to reconcile conservation and development agendas (Wells et al., 1992; Wells et al., 1999; Agrawal & Gibson, 1999; Hughes & Flintan, 2001; Sandker et al., 2009). As far as is known from the literature, mapping of the institutional bodies conducting protected area management at the different levels has never been prioritized in Asia to understand how these landscape management systems (e.g. ICDPs) might break down, or



A mosaic of grassland and forest habitats inside the Periyar Tiger Reserve © N.P. Jayan

rather, how these management systems may be strengthened.

In 2013, Parr et al. mapped out the institutional arrangements for managing government-managed protected area landscapes through multi-level collaborative management, from the individual village to the landscape in and around the protected area. This theoretical management system tentatively made some notable recommendations. The paper highlighted the need to recognize the different fields of protected area management, and that conservation impacts in each of these fields of management could be optimized through the establishment of protected area working groups in each of these specialized fields. The operational functioning of these working groups could, in turn, be linked through a bridging supervisory body comprising key landscape stakeholders linking the core zone (biodiversity protection) and the buffer zone agendas (e.g. threat mitigation, poverty alleviation, climate change adaptation and illegal wildlife trade). However, the multi-level collaborative management system theory was based upon an unconnected assortment of management examples from four protected areas in Lao P.D.R. and Vietnam. Therefore these recommendations on landscape protected area management could only gain a certain level of credence.

This paper examines the multi-level collaborative management system in a single site, Periyar Tiger Reserve in southern India, which is deemed to be one of the best managed protected areas in Asia. The paper assesses the management system's potential as an

exemplar to protected areas practitioners elsewhere in the region, and discusses how such a system might be initiated.

PERIYAR TIGER RESERVE AS A CENTRE OF EXCELLENCE

India has one of the longest established protected area systems in Asia. In October 2012, the Periyar Tiger Reserve (PTR) was awarded the United Nations India Biodiversity Governance Award by the Government of India and the United Nations Development Programme (UNDP) for the best-managed protected area in the country (UNDP, 2012). Periyar was also designated a 'conservation model' by the Tiger Task Force commissioned by the Government of India in 2005 and has won several accolades in local and national media due to its efforts to improve the relationship between local communities and the Forest Department through various development initiatives (Narain et al., 2005).

PTR is situated in the Cardamom and Pandalam Hills of the Southern Western Ghats. Administratively, the reserve falls in Idukki, Kottayam and Pathanamthitta Districts of Kerala State. The total area of the reserve is 925 km² of which 881 km² is core zone and the remaining 44 km² is designated as buffer zone. Periyar is one of the best protected areas for long-term tiger conservation due to its vastness, and the contiguity of the forests in Kerala and Tamil Nadu. A survey conducted in 2010, counted 36 -40 adult tigers in the Periyar landscape, between the PTR and Neyyar Wildlife Sanctuary. It also supports significant populations of other large mammals including 500-600 Asian elephants *Elephas maximus*, gaur *Bos*

guarus, sloth bear *Melursus ursinus* as well as two endemic primates of the Southern Western Ghats, the lion-tailed macaque *Macaca silenus* and Nilgiri langur *Trachypithecus johnii*. The site protects 62 species of mammals, 318 species of birds including 14 endemics, 44 species of reptiles, 16 species of amphibians, 38 species of fishes and 119 species of butterflies which have been formally identified to date. Six tribal communities, comprising the Mannan, Paliyan, Urali, Ulladan, Malayarayan and Malampandaram, live either in the interior of the Tiger Reserve, or on its fringes.

THE INDIA ECO-DEVELOPMENT PROJECT (1996-2004)

In 1996, PTR was one among seven protected areas in India selected for the implementation of the India Eco-Development Project (IEDP). The project was planned initially for a five year period, but was extended twice until 2004 (IEDP, 2004). The project had four major components. The first component comprised improved protected area management, improving the protected area planning process and capacity building, protecting and managing ecosystems and habitats within the protected area; and upgrading protected area amenities for the field staff. The second component, village eco-development, comprised conducting participatory micro-planning, providing implementation support, and implementing reciprocal commitments that foster alternative livelihood and resource uses. This component was financed by a village eco-development programme which specified measurable actions by local people to improve conservation. A third education and awareness component comprised promoting public support for conservation through environmental education and awareness campaigns. A fourth component comprised impact monitoring, and research. This last activity was aimed at improving the understanding of issues and solutions relevant to protected area management as well as the interactions between the protected area and local people. At the start of the IEDP in 1996, the Government of Kerala established a Protected Area Co-ordination Committee (PACC), to establish a system of decision making, involving the different stakeholders at the protected area level; in 1998, this landscape management body was renamed the Eco-development Implementation Committee. Seventy-two villages comprising 5,584 families (total population: 28,000) were targeted under the IEDP (IEDP, 2004).

PROTECTED AREA MANAGEMENT ACTIVITIES

Over the last three decades, the management authorities of PTR increasingly recognized the need to compartmentalize the management of the reserve into

specialized areas of work. In more recent years, each specialized field of protected area management was allotted a specific chapter in three successive 10-year management plans prepared from 1986 to 2012, (Nair, 1978; Kaler, 2001; and Shukla, 2012). These specialized fields of protected area management comprise: (i) research and monitoring, (ii) law enforcement involving patrolling, (iii) species and habitat management, (iv) community outreach and conservation awareness, (v) eco-development (including livelihood development) and (vi) tourism (see Figure 1). Unique to Periyar, the management plans also addressed pilgrim management, as some 10 million pilgrims enter the core of the reserve annually.

INSTITUTIONAL BODIES UNDERTAKING THE DIFFERENT SPECIALIZED FIELDS OF MANAGEMENT

A detailed description of the different bodies, their interactions and the management activities undertaken in PTR are outlined below and in Figure 1, as these have a direct bearing on how the reserve authority developed the management systems to address the landscape management tasks.

(i) Research and monitoring

Research and monitoring section: A core research and monitoring programme within the PTR is undertaken through a well-equipped research and monitoring section, comprising a Research Range Officer and his support staff. This team conducts routine monitoring activities, including making an inventory of park fauna and monitoring the tiger population.

Regional level Research Coordination Committee:

Over the years, the research programme was further supported by many national and international scientists, as well as research fellows. A regional level Research Coordination Committee was constituted through a Government Order under the chairmanship of the Field Director, in order to create a network of different research institutions and individuals to build synergy in research and monitoring initiatives.

(ii) Law enforcement

Camps and patrolling teams: Protection of the reserve is ensured through the implementation of protection strategies, comprising an integrated system of camping teams and patrolling teams, supported by a strike force/flying squad. This protection system has been strengthened over the last three decades. As of December 2013, five camps keep surveillance over the most vulnerable parts of the interstate border, while a

further two camps are located in the interior. Further anti-poaching camps are planned, bringing the total number of anti-poaching camps to 12. In addition, six special protection teams were constituted for effective patrolling operations. These patrolling teams are equipped with sufficient arms and ammunitions, wireless sets, camping equipment and vehicles to move around. Each patrolling team has a specific assignment.

Protection watchers: The reserve engages about 120 protection watchers from the neighbouring area population on regular daily wages. The Eco-development Committees (EDCs) also monitor illegal sandalwood *Santalum album* activities. Guards are also temporarily employed. The PTR authorities claim that surveillance by villagers significantly reduces illegal poaching of animals and valuable trees like sandalwood.

(iii) Species and habitat management

Species management: This includes the annual removal of exotic weeds including *Lantana*, *Eupatorium*, *Mikania* and *Mimosa invisa*.

Habitat management: (a) *Forest fire management:* Fire prone areas are protected by various strategies including clearing fire lines, engaging fire gangs and practising participatory fire management. These activities are carried out in tall grass areas, protecting shola forests and small evergreen patches. Fire lines are also used as patrolling routes. In addition, controlled pre-burning is practised. Specific fire management plans at range-level are prepared annually before the fire season. Fire plans include details of fire prone areas, fire lines, the strategic locations of fire gangs with number of members to be deployed, monitoring mechanisms and reporting. Fire incidents are reported immediately along with the extent of the area burnt. (b) *Waterholes:* In addition to the natural water sources in the reserve, artificial waterholes have been created to ensure water availability to animals during peak summer.

The EDCs were established to undertake eco-development activities. As part of mutual commitments, they have become involved in removal of exotic weeds, fire prevention, afforestation and conservation in the fringe area (Government of Kerala, 2006).

(iv) Community outreach and conservation awareness

Nature education: Community outreach is undertaken through the eco-development programmes. The PTR management authority undertakes a variety of nature education activities in and around the reserve, promoting environmental awareness and love for nature. These

comprise nature camps for students, members of NGOs and the neighbouring communities; extension programmes including slide-shows and film shows in the buffer zone; conservation education programmes in local colleges and schools; and street plays, dance and music performed to the local communities. A plastic free day is organized regularly on the 28th of every month in Periyar with the active involvement of local people, visitors and park officials. Leaflets and brochures, stickers, posters and name slips carrying messages of conservation are distributed to different target groups. A newsletter for PTR is also published periodically.

(v) Eco-development

The PTR authorities created a livelihood development capacity led by an Eco-development Officer within the protected area agency in March 1998 to engage with communities in the buffer zone (within 2 km of the boundary) through the District level Coordination Committees and to promote EDCs.

Neighbourhood, professional and user group

EDCs: After initial surveys and consultation by the protected area staff, a number of village-level EDCs were established. The Government of Kerala issued guidelines for the process, structure and responsibilities of these committees in December 1996. Different communities had different dependencies within the reserve, such as the collection of fuelwood, cattle grazing, extraction of cinnamon bark, fishing, and running pilgrim service centres. These different dependencies necessitated different strategies/solutions to address and mitigate protection issues as well as livelihood issues. Consequently, prolonged discussions were held with various groups to help in establishing EDCs which were also based on locality, ethnicity, and professional backgrounds at the start of the project. The tribal groups on the fringes of the PTR also formed EDCs according to their ethnicity and culture. Labourers engaged by merchants and traders along the pilgrimage route to Sabarimala Temple formed a number of pilgrim related EDCs (*Swamy Ayyappan Poonkavanam Punaruddharana*) at different localities along the footpath to the temple.

Each neighbourhood EDC (otherwise known as a village-level EDC) was formed involving c. 100-150 families, and two adult members (a man and a woman) from each family would be included in the General Body. The General Body nominated seven representative members from within the Body to act as an Executive Committee. Micro-plans were then prepared jointly by the Executive Committee, protected area authorities and professionals from respective fields (e.g. ecologist, economist,



Nocturnal wildlife spotting, part of the community-based ecotourism programme © M. Ramesh Babu

sociologist, etc.) through Participatory Rural Appraisal (PRA). The micro-plans contained the eco-development activities. A fundamental component was the requirement for each committee to contribute to the protection and management of the reserve. In return, they were given opportunities, essentially granted tourist or resource concessions, to earn their livelihoods. The EDCs were categorized by the protected area staff and supporting IEDP project staff into four functional groups depending on their mode of operation:

- *Neighbourhood EDCs*: families in a particular geographical or administrative area
- *Professional EDCs*: organized along occupational lines
- *User Group EDCs*: organized to utilize a particular physical resource
- *Pilgrim Management EDCs*: organized to provide a specific service to pilgrims

As of January 2012, 76 Eco-Development Committees (EDCs) have been established from an overall target population of 28,000 people living within a 2 km radius of the PTR. These include 56 neighbourhood, seven professional, nine pilgrimage and four user group EDCs. All these EDCs are functional and require continued support from the Department to varying degrees. Members of the EDCs are considered assets to the management for sustained protection of the reserve

where, in turn, they benefit socially and economically with improved livelihoods. Many poachers have been converted to protectors through the eco-development programme. For example, two EDCs consist primarily of former cinnamon bark smugglers and poachers. Furthermore, there is one EDC comprised exclusively of women.

Confederations/Forest Development Agency

(FDA): The constitution of FDA was initiated in the year 2002, through a Government Order (No. 223/02/F&WLD dated 17.07.2002). All the EDCs, situated either within the East or West Divisions of the PTR, function under the East and West Confederation and Forest Development Agencies. The purpose was to create a platform through which the various line departments like tribal welfare, horticulture, village self-government organizations (*panchayat*), soil conservation, and others achieve synergy and convergence of various developmental activities within the Districts. It also prioritizes the developmental activities within the forest fringe areas thus benefitting the fringe area communities.

District level Coordination Committee: In 2006, a District level Coordination Committee for PTR was proposed to coordinate eco-development activities which promote afforestation and conservation activities in the

buffer zone (Government of Kerala, 2006), comprising protected area, forestry and district staff, representatives from other concerned government departments and the Deputy Director, Periyar East (Secretary). This committee also facilitates coordination and mainstreaming of wildlife concerns at the field level. The committee meets at least once every six months.

(vi) Tourism

Coordination Committee of Professional Group

EDCs: During the phase of the India Eco-Development Project (IEDP), community-based and protection-oriented ecotourism (CBET) programmes were initiated in the PTR. The objectives of the community-based ecotourism programmes are to enhance reserve protection; help local people to earn subsistence and supplementary livelihoods; to wean local people away from illegal activities such as bark smuggling and poaching; to enhance visitor satisfaction; and disseminate conservation values. Traditional/local skills of the communities are utilized to operate the programmes in the buffer zone comprising trekking and camping in the forest, bamboo rafting, riding bullock carts and making artefacts. The CBET programmes are integrated into the micro-plans of the EDCs. The CBET programmes are monitored and co-ordinated by a Coordination Committee of Professional Group EDCs.

PROTECTED AREA MANAGEMENT WORKING GROUPS

At least four protected area management working groups have been established in Periyar over the last two decades, in four specialized fields of protected area management. These comprise:

1. A coordinated research programme in the Tiger Reserve was facilitated by the establishment of a regional level Research Coordination Committee in December 1996.
2. Law enforcement was largely mandated to the protected area agency, through comparatively high levels of government rangers. However, the law enforcement agenda was augmented by a network of protection watchers.
3. A District level Coordination Committee as well as the East and West Confederation and Forest Development Agencies coordinate the livelihood interventions as the core agenda of the eco-development programme undertaken by the Eco-development Committees (EDCs) of the East and West Divisions of PTR.
4. A Coordination Committee of Professional Group EDCs monitored and coordinated the community-based ecotourism programmes.

Developing landscape collaborative management arrangements

On 11 December 1996, the Government of Kerala established a protected area level coordination committee, to establish a system of decision making involving different stakeholders at the protected area level (Government Order (Rt) No.429/96/F&WLD). This PACC was established to oversee the formation and functioning of the EDCs, including investments and village work plans; co-ordination of the protected area mutual interaction assessment and finalizing the village micro-plans; monitoring the agreements on biodiversity conservation by the village EDCs; and finalizing a semi-annual progress report, annual work plan, as well as provide assistance in a mid-project review and the preparation of completion reports.

In May 1998, the membership of the PACC was revised, and focused on the eco-development agenda. It was thus renamed the Eco-development Implementation Committee (EIC) under the Chairmanship of the Field Director (Government Order (Rt) No. 251/98/F&WLD). The composition of this Committee comprised protected area staff, other forestry officials, two chairpersons from the Village EDCs, and elected members of local administrative bodies, among others.

The EIC was functional only during the project period of IEDP (implemented from 1996 to 2004). In order to continue the activities implemented during the IEDP period and sustain the eco-development activities, a Government-Organized Non-Government Organization (GONGO) – the Periyar Foundation – was established on 27 July 2004. This Foundation sustains the process of participatory management, which had grown and evolved manifold beyond the project period (Government of Kerala, 2004). The Foundation provides oversight over a Trust Fund which is largely sustained through the various community-based ecotourism activities carried out in PTR, including the entry fees from the pilgrimage and generated fees. These funds are earmarked through an Annual Plan of Operation approved by the Governing Body of the Foundation and are divided as follows: protected area management (30 per cent), village eco-development (40 per cent), education and awareness (5 per cent), research and monitoring (5 per cent), and administration of the Foundation (20 per cent). Significantly, the Foundation hires professional staff, including a conservation biologist, an ecologist, a sociologist, a nature education officer, an assistant nature education officer and administrative staff.

A schematic overview of the present institutional arrangements is presented in Figure 1.

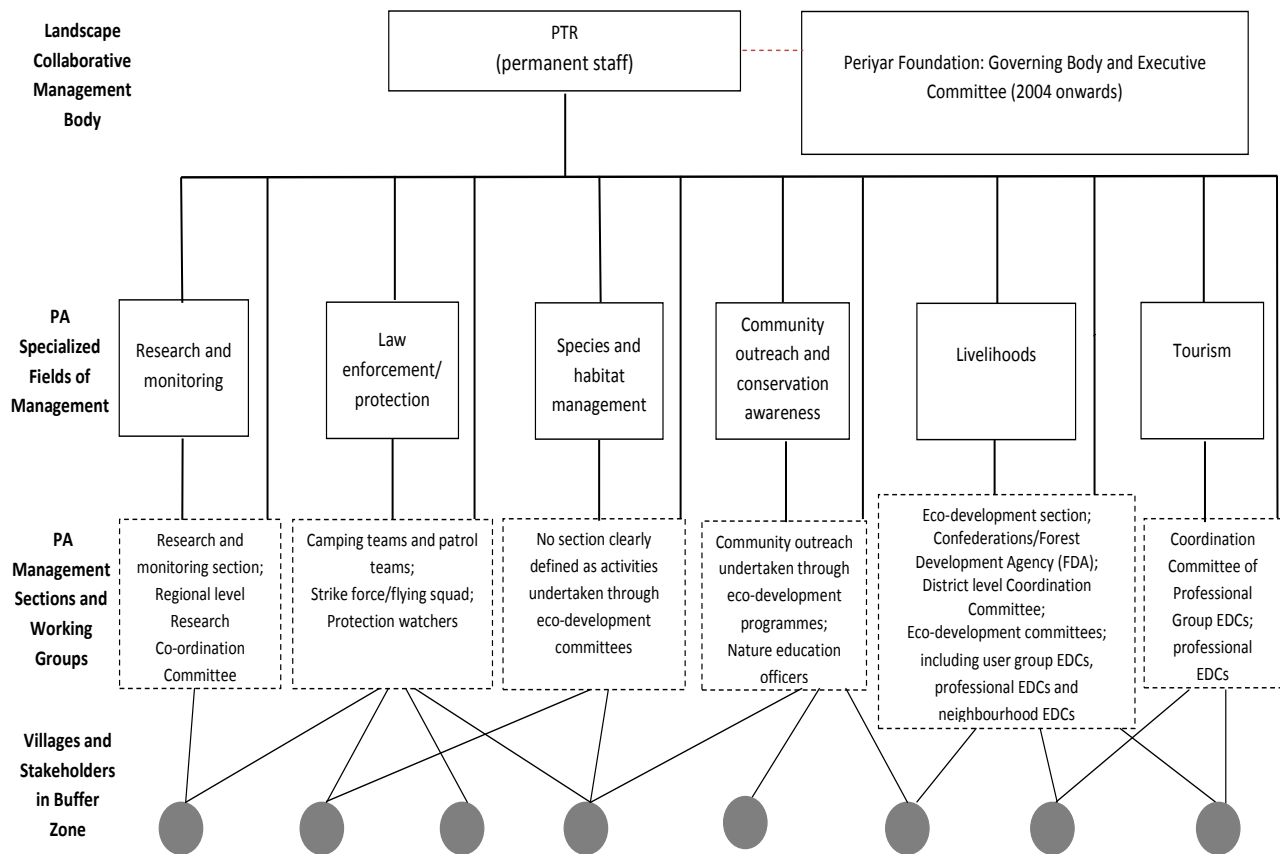


Figure 1. Multi-level collaborative management arrangements in Periyar Tiger Reserve (as of 2014)

DISCUSSION

Mapping of the institutional arrangements in a multi-level collaborative management system like PTR can only identify the institutional bodies and their presumed working relations between management levels, and within the management bodies themselves. The effectiveness of the institutional bodies described at the different management levels is based solely upon the relatively extensive literature on Periyar. The primary objective of this paper is to outline a holistic picture of the landscape management arrangements for the Tiger Reserve, which is still evolving and is therefore dynamic (PTR Director, pers. comm.). It also needs further assessment by protected area practitioners, particularly regarding its feasibility and applicability involving more modest funding streams (i.e. without World Bank funding or pilgrimage entrance fees) and in developing countries with lower government capacity.

LANDSCAPE-LEVEL INSTITUTIONAL MANAGEMENT ARRANGEMENTS

During the past three decades, two landscape management systems, namely the PACC (1996-1998) and the EIC (1998-2001) operated under the auspices of the IEDP. The former had a broader agenda of protected

area management while the latter was established to ensure successful implementation of sustainable eco-development activities, and ultimately to ensure biodiversity conservation with community participation. Both systems were ultimately established to achieve the goal of biodiversity conservation. The third landscape management body, the Periyar Foundation, was devised after the termination of the IEDP specifically to have a high level of adaptive management flexibility, but also with the ability to construct a landscape-level stakeholder group. The establishment and subsequent functioning of these three institutional bodies suggests that these landscape level coordination bodies may constitute a critical institutional body to provide overall direction to collaborative management undertaken within a protected area landscape, encompassing both the core zone and the peripheral villages.

However, the rejigging of the committee membership over the two decades indicates that Periyar has had teething problems with the functioning of this umbrella landscape body, which still remain. There has been a strong slant in membership towards government officials, and particularly representatives from the Forest Department and conservation sectors. This bias



The EDC making recyclable bags for the pilgrimage © Ramesh Mohan

constrains the full range of stakeholder viewpoints to be heard, understood and responded to, through management actions. This is of particular concern, given that the protected area has successfully established a number of protected area working groups, and each of these working groups could be providing feedback on different aspects of protected area management.

THE SIGNIFICANCE OF ESTABLISHING A GONGO AND TRUST FUND FOR PILOTING COLLABORATIVE MANAGEMENT

PTR established the Periyar Foundation in 2004, primarily as a means to extend the IEDP and buffer zone engagement, which was also devised specifically to have a high level of adaptive management flexibility, and promote landscape protected area management. As such, the Foundation was a pioneering effort. This institutional mechanism permits the government protected area agency to promote and actively engage in a wide variety of livelihood development activities in the buffer zone, which are directly linked to conservation (Joseph, 2009). The Foundation has maintained the eco-development programme through hiring professional livelihood

development personnel and other specialists. Being a tiger reserve, the Foundation is now under the National Tiger Conservation Authority. Following the success of the Foundation concept, each tiger reserve in the country is now meant to establish a Tiger Conservation Foundation. Sharma (2008) noted that the GONGO management approach permits the protected area authority to overcome mandate constraints and undertake self-directed agendas, particularly with respect to community engagement in the buffer zone.

In the broader Asian regional context, this institutional/funding mechanism permits a conservation agency with negligible livelihood development experience to initiate an entire suite of activities undertaken in their protected area landscapes, and to pilot livelihood interventions linked to threat mitigation and collaborative management at a pace and level that they are content with. Government protected area agency personnel as well as conservation NGO personnel, particularly those supporting the fortress conservation philosophy, may also be more comfortable with supporting a collaborative management approach under these evolving management systems.

ESTABLISHING SPECIALIZED FIELDS FOR EFFECTIVE LANDSCAPE MANAGEMENT

Protected area management tasks: It is an important first step for the protected area staff to be organized into the different specialized fields of management and then trained in the respective fields for effective management, rather than undertaking multi-tasking roles in protected area management. Over the last three decades, PTR has recognized six different fields of specialization (see Figure 1) in protected area management (e.g. Kaler, 2001). These management arrangements conform with the proposed field management arrangements for a government-managed protected area described elsewhere, under which landscape collaborative management functions (Appleton et al., 2003; Parr, 2006, Parr et al., 2013). Mishra et al. (2009) endorse this fundamental first step, noting that the success in Periyar was achieved because of strong leadership as well as committed and trained teams in the different fields of management for proper implementation of the activities.

Protected Area Management Working Groups: At least four protected area management working groups have been established in Periyar over the last two decades, in four specialized fields of protected area management. These comprise the (i) Regional level Research Co-ordination Committee, (ii) patrol teams supported by an informants' network, (iii) District level Co-ordination Committees promoting livelihood agendas linked to the eco-development committees, and (iv) a Coordination Committee of Professional Group EDCs for tourism. These working groups appear to be some of the institutional engines that drive effective landscape protected area management, optimizing impact through partnership relationships with concerned stakeholders, including the EDCs themselves. At Periyar, these protected area management working groups were established and sustained in response to the funding from the IEDP project. The Government of Kerala has made every effort to maintain these working groups, and the multi-level collaborative management system, using government funding streams. McShane and Wells (2004) concluded that most ICDPs need ongoing financial support or they collapse, Periyar has had the advantage of World Bank funding, augmented by ongoing pilgrimage entrance fees.

The establishment of protected area management working groups introduces potentially interesting human resource dynamics to protected area management in Asia and the way it is conducted. Rather than rely on large numbers of protected area staff running these field

programmes single-handedly, the conservation agency can look for government partners and other interested individuals to work with the local communities, and thence build up constituency support for the protected area and its well-being. Consequently, fewer protected area staff are required to run the different specialized programmes, law enforcement aside, which may be significant in developing countries with low staffing levels and high threat levels. However, the protected area staff who lead these protected area working group programmes need to be well-qualified to maintain the functioning of the working groups and their programmes of work, to maintain the interest of their members, and deal with financial aspects.

The concept of protected area management working groups has rarely been discussed amongst protected area practitioners as a notable institutional body, but given the ratio of protected area staff to local communities, the capability to maximize interactions with these stakeholders through tiered institutional bodies must be deemed beneficial. Further investigation of the role and functioning of these working groups should be conducted in other protected areas in Asia. It is presently impossible to conjecture in any Asian scenario whether as these working groups become more robust, particularly in the buffer zones, we should expect a corresponding reduction in the need to maintain intensive patrolling in the core zone.

Eco-Development Committees: The establishment of EDCs appears to have been an extremely successful initiative (Balasubramaniam & Veeramani, 2008). These village level committees were established according to their functionality, and establishing EDCs on the basis of social, ethnic and occupational groups gave each EDC a strong degree of homogeneity that helped to develop and nurture mutual cooperation and trust. The promotion of site-specific micro-plans enabled the prioritization of grassroots level social realities to influence the design and implementation of the India Eco-development Project. The funding of these EDCs was maintained through the establishment of revolving community development funds by the IEDP.

According to Bhardwaj & Badola (2007), the eco-development initiatives had a number of progressive points. The PTR authorities began to understand the people's needs, and the negative impact of protected area policies. They also focused on the needs of the less privileged and poorest people, and attempted to support these households in programme design, and stressed 'ownership' of the eco-development programme by the local communities, by stipulating cost-sharing. The



Birdwatching in Periyar Tiger Reserve with local guides © M. Ramesh Babu

development of human capital through continued capacity building of local people and Forest Department personnel was emphasized. The involvement of vibrant and representative grassroots level institutions was recognized as being necessary for the success of the programme. Above all, they recognized and laid emphasis on social issues in conservation. Success was sustained by the robust grass-root level institutions, the creation of social capital, policy support, networking, strong conservation and development linkages, and by dovetailing with the mainstream development activities. More importantly, the Eco-development Project improved the *relationships* between the local communities and the PTR (Chaudhuri, 2013).

A recent study based on a survey of attitudes of local communities living around protected areas in India and Nepal shows that most people have favourable attitudes towards protected areas, as long as they gain economic benefits from ecotourism and collection of minor forest products (Karnath & Nepal, 2012). The ongoing eco-development activities resulted in the emergence of new social relationships not only between the local

communities and the PTR as well as the Forest Department, but also between the community members themselves, resulting in new social networks and an emerging moral economy amongst the villagers-turned-conservation workers that could not have been anticipated at the onset of the World Bank project (Chaudhuri, 2009).

Weak linkages in the multi-level collaborative management system: PTR has established a diverse system of EDCs at the village level. A number of institutional bodies, including four protected area working groups, support the operation of these EDCs. However, there seems to be a lack of representation of spokespersons from the working groups and related institutional bodies on the landscape protected area committees, including the Periyar Foundation. Improved stakeholder representation on the landscape protected area committee might facilitate better grassroots feedback to senior reserve management on field activities and constraints to effective management. Ebregt and De Greve (2000) stated that it usually takes a long time to establish a stable institutional structure, as the multi-

disciplinary planning process for landscape management involving the buffer zone is complicated, due to the many stakeholders involved at different levels, ranging from indigenous people to government officials.

Evidence of multi-level collaborative management in a government designated protected area: Sandker et al. (2009) recommended devoting greater attention to improving local environmental governance as the highest priority for investment for developing effective integrated conservation and development initiatives. Mishra et al. (2009) stated that an elaborate institutional mechanism for implementation of the IEDP in PTR had been put in place. PTR demonstrates a good example of multi-level collaborative management, involving landscape level collaborative management, strong recognition of the different fields of management specialization, a number of structured protected area management working groups and a strong village level agenda through the 76 EDCs. These management arrangements appear to endorse the need for joint management of living resources (Berkes et al., 1991) and multi-level governance (Bloomquist, 2009), as well as the generic multi-level collaborative management arrangements for a government-managed protected area proposed by Parr et al. (2013).

CONCLUSIONS

The Forest Department in Kerala State has developed some fascinating multi-level collaborative management arrangements to manage the PTR. These arrangements have evolved through the methodical problem-solving of dedicated forestry officers over a 20-year period. They have introduced practical institutional solutions, including a GONGO, village level EDCs, a number of protected area working groups and several evolving 'takes' on the landscape collaborative management arrangements. While the number and diversity of these institutional arrangements may have been established and maintained by sizable catalytic funding streams from the India Eco-development Project, the institutional arrangements within PTR are worthy of further in-depth analysis, understanding and monitoring.

The relative obscurity of multi-level collaborative management arrangements in government-managed reserves in the protected area literature could be a consequence of several factors. Firstly, many countries in Asia find the transition from the fortress approach to participatory collaborative-management approaches simply too complex, and with too many hurdles. Secondly, the institutional arrangements may exist, but are deemed either uninteresting or unimportant to

report. Lastly, the project staff and/or conservation NGO personnel piloting innovative landscape management may have substituted themselves for several of the key collaborative management bodies, for smoother, unhindered protected area management during project implementation, and effectively became the protected area working group coordinators.

RECOMMENDATIONS

All protected area agencies in Asia should review their protected area arrangements at the field level, and assess whether they are supporting organizational arrangements that recognize the different fields of specialization. The organizational arrangements within the respective protected area agencies themselves should also be geared towards supporting the respective field units; in many countries in the region they are not.

Protected area agencies in Asia in which the agencies are constrained in their mandates to engage communities in their buffer zones should consider the merits of piloting GONGOs, involving the establishment of site-level trust funds, as a means to deliver highly flexible conservation and development agendas in their protected area landscapes.

Protected area agencies and conservation organizations should conduct detailed assessments of understanding, attitudes, and constraints within the protected area agencies towards the benefits of promoting landscape protected area management. It is important that the legal constraints, the management constraints and the government civil servant constraints are fully understood, particularly regarding community engagement in the buffer zone. A detailed assessment should also be undertaken of the understanding, attitudes and constraints towards collaborative management and fortress management approaches within protected area agencies, and their pros and cons, particularly targeting the most competent protected area managers as they may become potential change agents for their colleagues.

Protected area agencies and conservation organizations should promote and evaluate the establishment and functioning of protected area working groups in protected areas. Priority collaborative management areas are enforcement, community outreach and livelihood promotion, piloting small grants towards threat mitigation to buffer zone villages.



The Periyar landscape supports a population of some 500-600 Asian elephants © N.P. Jayan

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REFERENCES

- Agrawal, A. and Gibson, C.C. 1999. Enchantment and disenchantment: The role of community in natural resource management. *World Development*. 27: 629–649.
- Appleton, M. R., Texon, G.I. and Uriarte, M.T. 2003. *Competence Standards for Protected Area Jobs in South East Asia*. Los Baños, Philippines: ASEAN Regional Centre for Biodiversity Conservation.
- Balasubramanian, S. and Veeramani, A. 2008. *Eco-Development Initiatives in Kurisumala Watershed Region – Suggestions for the Sustenance of EDCs*. Thekkady: Periyar Tiger Reserve.
- Berkes, F., George, P. and Preston, R. 1991. Co-management: The evolution of the theory and practice of joint administration of living resources. *Alternatives*. 18 (2): 12–18.
- Bhardwaj, A.K. and R. Badola, R. 2007. *Assessment of eco-development initiatives in Periyar Tiger Reserve, Kerala*. Dissertation. Dehra Dun: Wildlife Institute of India.
- Bloomquist, W. 2009. Multi-level Governance and Natural Resource Management: The Challenges of Complexity, Diversity, and Uncertainty. In: V. Beckmann and M. Padmanabhan (eds.) *Institutions and Sustainability*, pp. 109-126, Springer Science and Business Media.
- Borrini-Feyerabend, G., Kothari, A. and Oviedo, G. 2004. *Indigenous and Local Communities and Protected Areas: Towards Equity and Enhanced Conservation*. Gland, Switzerland and Cambridge, UK: IUCN.
- Chaudhuri, T. 2009. *Social universe of a Protected Area: Community-based ecotourism in Periyar Tiger Reserve*. PhD Dissertation, Department of Anthropology. Seattle: University of Washington.
- Chaudhuri, T. 2013. From policing to 'social fencing': shifting moral economies of biodiversity conservation in a South Indian Tiger Reserve. *Journal of Political Ecology*. 20: 376–394.

- Corlett, R.T. 2007. The impact of hunting of the mammalian fauna of tropical Asian forests. *Biotropica*. 39: 292–303. DOI: 10.1111/j.1744-7429.2007.00271.x
- Ebregt, A and De Greve, P. 2000. *Buffer zones and the management, policy and best practices for terrestrial ecosystems in developing countries*. Theme Studies Series 5; Forests, Forestry & Biological Diversity Support Group, National Reference Centre for Nature Management: Wageningen, the Netherlands: International Agricultural Centre.
- Government of Kerala. 2004. Government Order (MS) No 36/2004/F & WLD. Protection of Periyar Tiger Reserve – Formation of Periyar Foundation for the continuance of the biodiversity conservation and community welfare initiation under the Eco-development Project. Forest and Wildlife Department. Thiruvananthapuram. Dated 27.7.2004.
- Government of Kerala. 2006. *Guidelines 2006 Participatory habitat management outside designated forest areas*. Forest and Wildlife Department.
- Hughes, R. and Flintan, F. 2001. *Integrating Conservation and Development Experience: A Review and Bibliography of the ICDP Literature*. London: International Institute for Environment and Development.
- India Eco-development Project. 2004. Phase III – Consolidated Final Report – Periyar Tiger Reserve,
- Joseph, G. K. 2009. Emergence of Periyar Foundation as a Model of Participatory Forest Management. In: *Shifting Trajectory of Ecology and Coexistence*. Proceedings of the National Seminar on People and Tigers, 22-23 September, 2008, Periyar Tiger Reserve, Thekkady.
- Kaler, O.P. 2001. Management Plan, Periyar Tiger Reserve. 2001-2002 to 2010-2011.
- Karnath, K.K. and Nepal, S.K. 2012. Local residents' perception of benefits and losses from protected areas in India and Nepal. *Environmental Management*. 49 (2): 372–386.
- McShane, T and Wells, M. (eds). 2004. *Getting biodiversity projects to work: Towards more effective conservation and development*. Columbia University Press, New York.
- Mishra, B.K., Badola, R. and Bhardwaj, A.K. 2009. Social issues and concerns in biodiversity conservation: Experiences of wildlife protected areas in India. *Tropical Ecology*. 50(1): 147–161.
- Nair, M. S., 1978. Management Plan, Periyar Tiger Reserve 1978-1979 to 1988-1989. Forest and Wildlife Department, Government of Kerala, Thiruvananthapuram.
- Narain, S., Panwar, H.S., Gadgil, M., Thapar, V. and Singh, S. 2005. *Joining the dots: The report of the Tiger Task Force*. Delhi: The Ministry of Environment and Forests, Government of India.
- Parr, J.W.K. 2006. Establishing Specialized Management Units within Protected Areas. *Tigerpaper*: Vol. XXXIII. (2): 6–11.
- Parr, J. W.K., Hoang Van Lam, Hoang Van Tue, Nguyen Bich Ha, Nguyen Van Lam, Insua-Cao, P., Nguyen Ngoc Quang, P., Nguyen The Cuong and Crudge, B. 2013. Multi-level Co-management in Government-designated Protected Areas – opportunities to learn from models in Mainland Southeast Asia. *PARKS*. 19 (2): 59–74.
- Robbins, P., McSweeney, K., Waite, T. and Rice, J. 2006. Even conservation rules are made to be broken: Implications for biodiversity. *Environmental Management*. 37: 162–169.
- Romero, C. and Andrade, G. 2004. International conservation organisations and the fate of local tropical forest conservation initiatives. *Conservation Biology*. 18: 578–580.
- Sanderson, S.E. and Redford, K. 2003. Contested relationships between biodiversity conservation and poverty alleviation. *Oryx*. 37: 389–390. DOI: <http://dx.doi.org/10.1017/S003060530300070X>
- Sandker, M., Campbell, B.M., Nzoo, Z., Sunderland, T.C.H., Amougou, V., Defo, L. and Sayer, J.A. 2009. Exploring the effectiveness of integrated conservation and development interventions in a Central African forest landscape. *Biodiversity Conservation*. 18 (11): 2875–2892. DOI: 10.1007/s10531-009-9613-7
- Sharma, R. 2008. Decentralized forest governance in Central Himalayas: A re-evaluation of outcomes. *Economic and Political Weekly*. 43(18): 54–61, 63.
- Shukla, R.R. 2012. *Tiger Conservation Plan, Periyar Tiger Reserve 2012-13 to 2021-22*. Core and Buffer: Forest and Wildlife Department, Government of Kerala, Thiruvananthapuram.
- Terborgh, J., van Schaik, C., Davenport, L. and Rao, M. 2002. *Making parks work: Strategies for preserving tropical nature*. Washington, DC: Island Press.
- UNDP. 2012. Winners of Government of India-UNDP Biodiversity Awards announced. Press Release. [accessed on 10 April 2014] <http://www.undp.org/content/undp/en/home/presscenter/pressreleases/2012/10/17/winners-of-government-of-india-undp-biodiversity-awards-announced/>.
- Wells, M., Brandon, K.E. and Hannah, L. 1992. *People and Parks: Linking Protected Area Management with Local Communities*. Washington DC: World Bank, WWF, USAID.
- Wells, M., Guggenheim, S., Khan, A., Wardojo, W. and Jepson, P. 1999. *Investing in Biodiversity. A Review of Indonesia's Integrated Conservation and Development Projects*. The World Bank, Washington, DC.

RESUMEN

Son pocos los casos en los que se han realizado mapeos institucionales sobre los acuerdos de múltiples niveles para la gestión participativa. Si acaso están documentadas, estas experiencias no han sido evaluadas. La Reserva de tigres de Periyar en los Ghats Occidentales en India es un área protegida estatal adecuadamente administrada y con recursos suficientes cuyas intervenciones de gestión se extienden a la zona de amortiguamiento. Ha sido designada por el Gobierno de la India como un Centro de excelencia para el aprendizaje, y es reconocida a nivel internacional por las prácticas eficaces de gestión. Este trabajo analiza los acuerdos institucionales de esta reserva en los diferentes niveles, desde la gestión a nivel de paisaje hasta el nivel de aldea. El análisis revela que un órgano de gestión participativa entre múltiples interesados parece ser importante para supervisar el manejo de áreas de paisaje protegido. La creación de la Fundación Periyar, una dinámica organización gubernamental-no gubernamental (GONGO), es

particularmente innovadora en términos de la facilitación de respuestas de gestión más ágiles, que han sido replicadas a nivel nacional a través de la Autoridad Nacional de Conservación del Tigre. Las tareas de gestión de áreas protegidas están adecuadamente definidas, con grupos de trabajo en gestión de áreas protegidas establecidos para cuatro esferas claves de gestión, con el consiguiente aumento en la participación constructiva con todos los grupos de interés prioritarios. Sin embargo, la representación de los interlocutores del grupo de trabajo en áreas protegidas en el órgano encargado de la gestión participativa del paisaje parece ser débil. Estos grupos de trabajo especializados interactúan con las 72 aldeas, 5584 hogares y 28.000 habitantes, a través de 76 comités de desarrollo ecológico. El mapeo institucional sobre la gestión participativa de múltiples niveles ofrece esperanzas para profundizar en la gestión de áreas de paisaje protegido.

RÉSUMÉ

Quelques cartographies institutionnelles de gestion collaborative multilatérale ont été réalisées, mais même pour celles qui sont documentées, ces expériences n'ont pas encore été évaluées. La réserve naturelle de Periyar dans les Ghâts occidentaux du sud est une aire protégée dotée de ressources gérées par le gouvernement dont les interventions de gestion se déploient jusqu'à dans la zone tampon. Elle a été désignée comme un centre d'apprentissage de l'excellence par le gouvernement de l'Inde, et est internationalement reconnue pour sa gestion efficace. Ce document tente d'analyser les dispositions institutionnelles de cette réserve, de l'échelle du paysage terrestre protégé à celle du village individuel. L'analyse révèle qu'un organe de gestion collaborative multilatérale paraît être important pour superviser la gestion à l'échelle du paysage terrestre protégé. La Fondation de Periyar, une organisation non gouvernementale dynamique organisée par le gouvernement (GONGO), s'est avérée particulièrement innovante pour faciliter des solutions de gestion souples, et ses méthodes ont été reproduites à l'échelle nationale par le biais de l'Autorité Nationale de Conservation du Tigre. Les tâches de gestion de l'aire protégée sont bien définies; des groupes de travail ont été créés autour de quatre domaines clés de gestion, augmentant ainsi l'engagement constructif de toutes les principales parties prenantes. Toutefois, la représentation des porte-paroles du groupe de travail dans l'organe de gestion collective du paysage terrestre protégé paraît plutôt faible. Ces groupes de travail spécialisés couvrent 72 villages, 5 584 ménages et 28 000 villageois, par le biais de 76 comités d'écodéveloppement. Une analyse plus approfondie de la cartographie institutionnelle de gestion collaborative multilatérale paraît opportune pour la gestion des paysages terrestres protégés



DETERMINANTS OF TOURISM ATTRACTIVENESS IN THE NATIONAL PARKS OF BRAZIL

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ABSTRACT

Understanding the determinant attributes that affect the tourism attractiveness of National Parks is a strategic planning tool for protected areas. This exploratory study assessed the relative importance of various internal and external park characteristics on visitation numbers in Brazil. Data were collected from several sources: 28 park managers, internal park documents, government databases and various websites. The study used correlation and regression analysis. Results demonstrated that tourism attractiveness in the national parks can be predicted through reputation, recreation facilities, attractions in the region and population density. Results show that both internal park attributes and external setting characteristics are considered by visitors. The results have practical utility and can be used to improve investments efficacy among the parks that already receive visitors, as well as serve to evaluate the tourism attractiveness for new parks. Also, findings are useful for the communities and small businesses located in the adjacent areas, since adequate prediction of visitor demand provides support for tourism activities.

Key words: Ecotourism, outdoor recreation, tourism attractiveness, national parks, Brazil

INTRODUCTION

Protected areas are globally considered as a key strategy for conservation of natural environments and species. Among the various types of protected areas, IUCN category II protected areas (e.g. national parks) have the objective to provide access for tourism and recreation. The promotion of tourism helps to raise societal awareness and increases support for biodiversity conservation. Category II, national parks offer numerous recreational settings that attract visitors, and the public use reinforces support for the creation and maintenance of such areas (Eagles & McCool, 2002; Weiler et al., 2013). In addition, visitor use management also creates alternative employment and income for local communities that are adjacent to parks, and is dependent on visitor flows and associated expenditures in the area (Emerton et al., 2006; Neuvonen et al., 2010; Thapa, 2013). Hence, the relationship of parks' attributes and regional characteristics along with visitation volume are essential for planning and management goals (Puustinen et al., 2009), given the local linkages as well as the need to optimize visitor experiences (Mulholland & Eagles, 2002).

Visitor demand and associated park choices have been extensively examined, and correlations with internal park features and related quality have been identified (Manning, 2011). However, external characteristics such as access, accommodations, and available services outside the park have also been noted as factors that influence visitation (Neuvonen et al., 2010; Puustinen et al., 2009). In fact, a site is considered by visitors within the larger context of a destination and is evaluated based on its tourism attractiveness (Formica & Uysal, 2006). The concept has been widely used to classify destinations, and has also been applied within the context of protected areas (Choi, 2012; Deng et al., 2002; Lee et al., 2010). Tourism attractiveness (Gearing et al., 1974) has been utilized to understand visitors' decision making processes and is dependent on availability of attractions and associated perceived importance (Formica & Uysal, 2006). Moreover, tourism attractiveness has been segmented into two broad categories: primary and secondary attributes. Primary attributes are innate to a destination and are related to its natural beauty and heritage, while secondary attributes are related to tourist infrastructure (Laws,

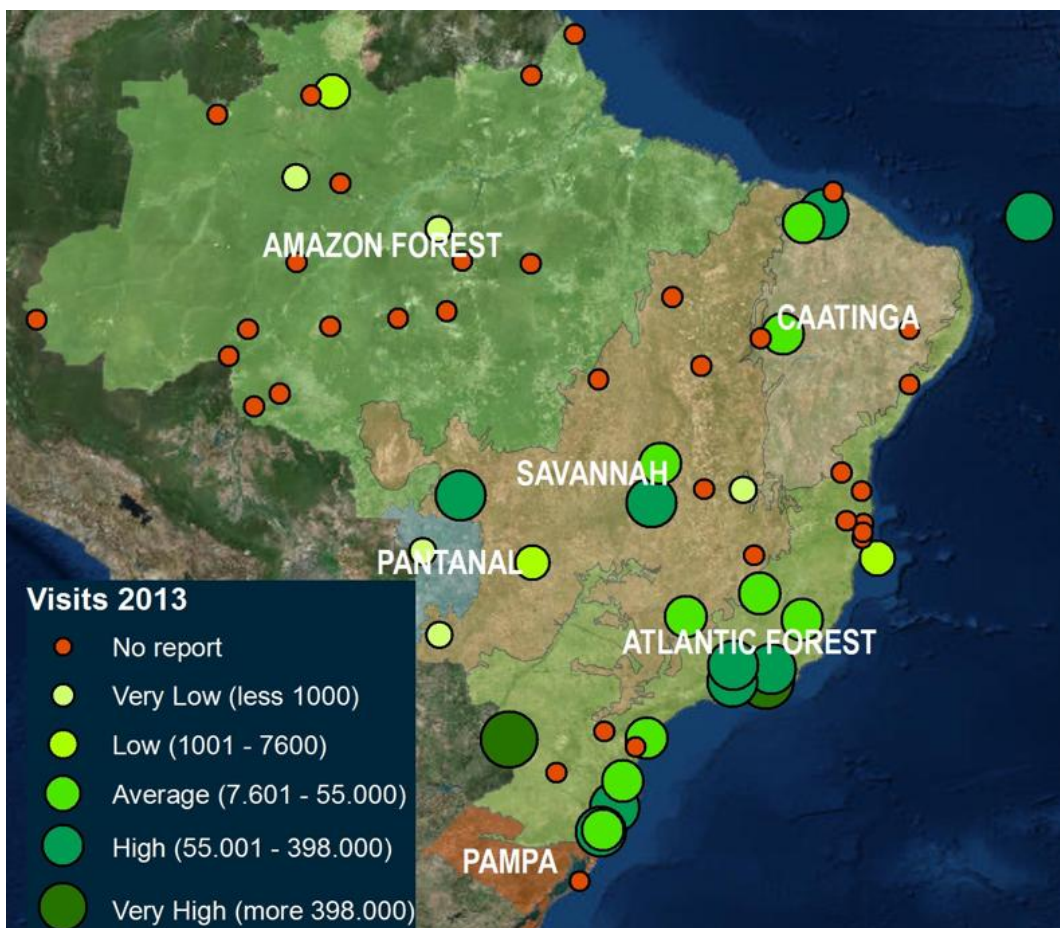


Figure 1: Visitation in national parks of Brazil in 2013

1995). The secondary attributes include accessibility, lodging facilities, food, services and activities. In addition, these have been further subdivided into internal and external attributes. In protected areas, internal are those that exist within, such as management policy, infrastructure and services. External are related to infrastructure and concentration of attractions around the protected areas (Puustinen et al., 2009). The determination of the relative importance of each of these factors is the most critical aspect for development of a destination (Hu & Ritchie, 1993; Neuvonen et al., 2010).

Most research has been based on qualitative analyses via expert panels (Deng et al., 2002; Lee et al., 2010) or quantitative tourist surveys (Choi, 2012; Thapa et al., 2011). While both approaches have their merits, limitations are evident given the subjectivity and ability to analyze multiple destinations, especially remote regions where most protected areas are located. Moreover, research has largely been focused on either a demand (i.e., tourists) or supply perspective (i.e., internal park attributes) with limited integration of both to understand visitation (Neuvonen et al., 2010). While demand-based research has been dominant, the supply side analysis has also emerged to further examine the relationships between park characteristics and visitation. An analysis by Puustinen et al. (2009) of 35 Finnish

national parks acknowledged that higher volume of visitation was associated with natural characteristics as well as the availability of recreational facilities inside and tourism services outside the parks. Furthermore, based on the same sample, Neuvonen et al. (2010) examined the visitation numbers in relationship to the parks' internal and external attributes and identified that recreational opportunities, trails, diversity of biotopes, and a park's age increased volume of visits from all around the country. However, a park's location was only significant in southern Finland. Overall, both studies provide an improved approach to the examination of park visitation which has demonstrated utility for planning, policy and management decisions.

Using a similar framework, this exploratory study was to further build and assess the relative importance of various internal and external park characteristics with respect to visitation numbers in the national parks of Brazil. The federal system of protected areas encompasses 76 million hectares divided into 320 units, of which 71 are designated as national parks (see Figure 1). Based on the scale and units, the national parks receive a comparatively small volume of visitors: 6.5 million in 2014 which is skewed towards two parks (Tijuca and Iguazu) that have an international brand image (ICMBio, 2014). The lack of visitor influx to other

Table 1: National Parks included in this study (ICMBio, 2014)

National Park Name	Year of establishment	Area (ha.)	Ecoregion	2013 Visits	
Tijuca NP	1961	3,950	AF	2,899,972	
Iguaçu NP	1939	185,262	AF	1,518,876	
Brasília NP	1961	42,355	CE	248,287	
São Joaquim NP	1961	49,300	AF	139,743	
Serra dos Orgãos NP	1939	20,020	AF	132,246	
Ubjara NP	1959	6,288	CA	108,529	
Serra da Bocaina NP	1971	104,000	AF	106,691	
Chapada dos Guimaraes NP	1989	33,000	CE	102,753	
Itatiaia NP	1937	30,000	AF	99,495	
Aparados da Serra NP	1959	10,250	AF	73,590	
Fernando de Noronha NMP	1988	11,270	MA	61,580	
Serra Geral NP	1992	17,300	AF	52,139	
Serra da Canastra NP	1972	71,525	CE	46,274	
Caparaó NP	1961	31,800	AF	32,245	
Chapada dos Veadeiros NP	1961	64,795	CE	27,407	
Serra do Cipó NP	1984	33,800	CE	25,438	
Sete Cidades NP	1961	6,221	CA	20,726	
Serra da Capivara NP	1979	129,000	CA	19,998	
Superagui NP	1989	33,988	MA	15,374	
Serra do Itajaí NP	2004	57,374	AF	10,221	
Abrolhos NMP	1983	91,255	MA	4,328	Key:
Emas NP	1961	132,642	CE	2,325	AF: Atlantic Forest
Virúá NP	1998	227,000	AM	2,000	AM: Amazon
Amazônia NP	1974	1,085,000	AM	686	CE: Cerrado (savannah)
Jaú NP	1980	2,272,000	AM	292	CA: Caatinga
Serra da Bodoquena NP	2000	76,481	CE	226	MA: Marine
Cavernas do Peruaçu NP	1999	56,800	CE	210	
Pantanal Matogrossense NP	1981	135,000	PA	146	

parks may be the result of various issues. For example, the lack of opportunities and infrastructure development has been evident. One possible cause is due to the Protected Areas Agency's longstanding viewpoint towards tourism. For the past 30 years, tourism has been perceived as an agent of change, such as exotic plants or fire which has justified strong restrictive policies for outdoor recreation in the national parks of Brazil (Zimmerman, 2006). Furthermore, the combination of lack of societal support and budgetary constraints has also created a vicious cycle which has hindered the growth of visitation and support for protected areas. In order to assist decision-makers and park managers with respect to resources allocation, investment priorities, and sustainability of protected areas, the objective of this study is to contribute to an enhanced understanding

based on factors that influence visitor flows to the national parks in Brazil.

METHODS

Sample: ICMBio (Chico Mendes Institute for Biodiversity Conservation) is the federal authority under the Ministry of Environment that is responsible for the management of Brazilian Federal Protected Areas. Among the national park units (N=71), there are only a few that are prepared for tourism, while others are minimally equipped, and most do not control access nor have entry fees. Based on the General Coordination of Public Use and Business, this study only included national parks (N=36) that had registered visitors in 2013 based on paid user fees (see Table 1).

Table 2: Operationalization of variables

Dependent variable		
Visits		Number of visitors in each park in 2013 (Log)
Independent variables – Internal Setting		
Physical Attributes	Reputation	Number of citations based on a Google search of the park's name and most important attraction in Portuguese and English (Log).
	Park Age	Number of years since the National Park designation.
Social Attributes	Diversity of Activities	Number of recreation and sports activities offered (i.e., trekking, climbing, diving, cycling etc.).
Managerial Attributes	Recreation Facilities	Number of structures offered (i.e., lookouts, parking lots, visitor centre, etc.).
	Visitor Services	Number of services provided by the park or concessionaires (i.e., transport, souvenirs, food etc.).
	Planning Tools	Number of management documents the park has produced and updated (i.e., General Management Plan, Outdoor Recreation Plan, Interpretation Plan etc.).
	Land Tenure	Percentage of the park owned by the government.
Independent variables – External Setting		
Physical Attributes	Regional Attractions	Number of tourism attractions in the region based on a TripAdvisor web search where the park is queried via the number of 'Things to Do' in the park's adjacent municipalities (Log).
Managerial Attributes	Hospitality Establishments	Number of lodging rooms and restaurants mentioned on Trip Advisor web search for municipalities adjacent to the park (Log).
Social Attributes	Socioeconomic Context	Average Human Development Index – HDI of the municipalities adjacent to the park.
	Population Density	Number of citizens living in adjacent municipalities included within a buffer zone of 100 km around the park (Log).
	Remoteness	Travel time to the park from the nearest large city (> 500,000 people) added to the time from closest national or international airport based on Google Maps tools. For boat access, the park managers were requested to provide the navigation hours (Log).
	Local Population	Population that live in the adjacent gateway municipalities of the park (Log).

Data collection: Data were collected from three different sources. First, primary data were collected from 28 park managers via an on-line survey during September 2014. Second, data were obtained from ICMBio internal documents (i.e., management reports). Third, secondary mediums such as government databases and various websites from the Internet were used. The use of the Web as a source of information within the tourism academic discipline has been found to be a reliable alternative as it is more practical and less costly than primary field data (Wood et al., 2013).

Operationalization of variables: Park visits were the dependent variable and were represented by the registered number of visitors in each national park [1]. For the independent variables, first, a comprehensive literature review was conducted prior to the development of the variables for the framework. Additional emphasis was given to the empirical studies on Finnish national parks (Neuvonen et al., 2010; Puustinen et al., 2009). A total of 13 independent variables were defined and operationalized. The identified variables were categorized based on the Recreation Opportunity

Spectrum (ROS) classification – Physical, Social, and Managerial (Clark & Stankey, 1979). The 13 variables within the three ROS classifications (Physical, Social, and Managerial) were further segmented into two categories of settings – Internal and External to the park (see Table 2). All variables were discussed and approved via a focus group session with park managers in August 2014.

Internal setting: The variables within this setting were reflective of internal attributes of a park, such as natural beauty, diversity of recreation activities, park age and planning tools. The physical category is usually comprised of park attributes that include natural beauty and historical heritage. However, the perception of beauty or importance thereof is subjective and poses measurement challenges (Neuvonen et al., 2010; Puustinen et al., 2009). Hence, the study opted to use the park's reputation as a proxy and was objectively measured based on Google Citations [2]. Essentially, each park's name as well as its most important attraction was queried in English and Portuguese [3] during April 2015. A second variable, park age, was also included within this category.

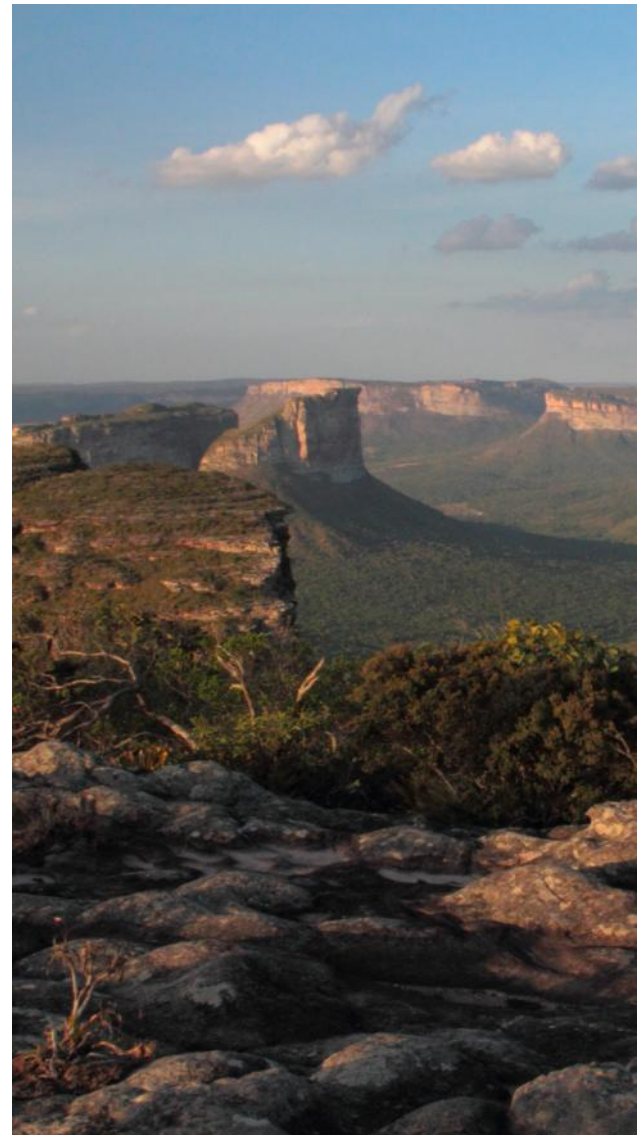
Table 3: Pearson' Correlation Coefficients

ROS	Variables	Pearson' correlation coefficient	p-value
Internal Setting			
Physical Attributes	Reputation	0.749**	0.000
	Park Age	0.462*	0.013
Social Attributes	Diversity of Activities	0.441*	0.019
Managerial Attributes	Recreation Facilities	0.610**	0.001
	Visitor Services	0.552**	0.002
	Planning Tools	0.062	0.754
	Land Tenure	-0.121	0.539
External Setting			
Physical Attributes	Regional Attractions	0.613**	0.001
Managerial Attributes	Hospitality Establishments	0.601**	0.001
Social Attributes	Socioeconomic Context	0.570**	0.002
	Population Density	0.645**	0.000
	Remoteness	-0.707 **	0.000
	Local Population	0.342	0.075

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)

The social category encompassed a variable that represented the diversity of recreation and sport activities located within the park (e.g., trekking, climbing, diving, etc.). The managerial category included variables that focused on recreation facilities (e.g., lookouts, parking lots, visitor centre) and visitor services (e.g., guides, concessionaires). In order to test ICMBio's historical assumption that visitation depends on secure land tenure and prior preparation of general management plans, variables such as planning tools (e.g., management documents, outdoor recreation plan) and land tenure (i.e., percentage of park ownership by the government) were also included.

External setting: The variables within this external setting were considered regional characteristics that could influence visitation, such as regional attractions, tourism infrastructure, socioeconomic context, and population density. More specifically, the physical category consisted of attractions in the park's region. Specific information was compiled from the TripAdvisor [4] website. The web link 'Things to do' was searched for information in regard to gateway communities/cities. Similarly, TripAdvisor was employed to compile information about tourism infrastructure such as accommodations and restaurants which were noted as hospitality establishments under the managerial category. The social category consisted of a park's gateway community population and density along with the socioeconomic context (i.e., average human development index – HDI). Information about the regions and population data were collected from georeferenced databases. Additionally, remoteness along



Chapada Diamantina National Park © Ernesto V Castro

Table 4: Summary of Multiple Regression Analysis

Variable	Partial R ²	B	p-value
Intercept		-1.397	0.214
Park Reputation	0.4942	0.552	0.037
Recreational Facilities	0.3810	0.110	0.007
Population Density	0.3002	0.278	0.036
Regional Attractions	0.2999	0.547	0.003
Adj. R ² = 0.772 F-test =23.831 N=28			
Note: B = Unstandardized Regression Coefficient; p-value = Level of Significance			

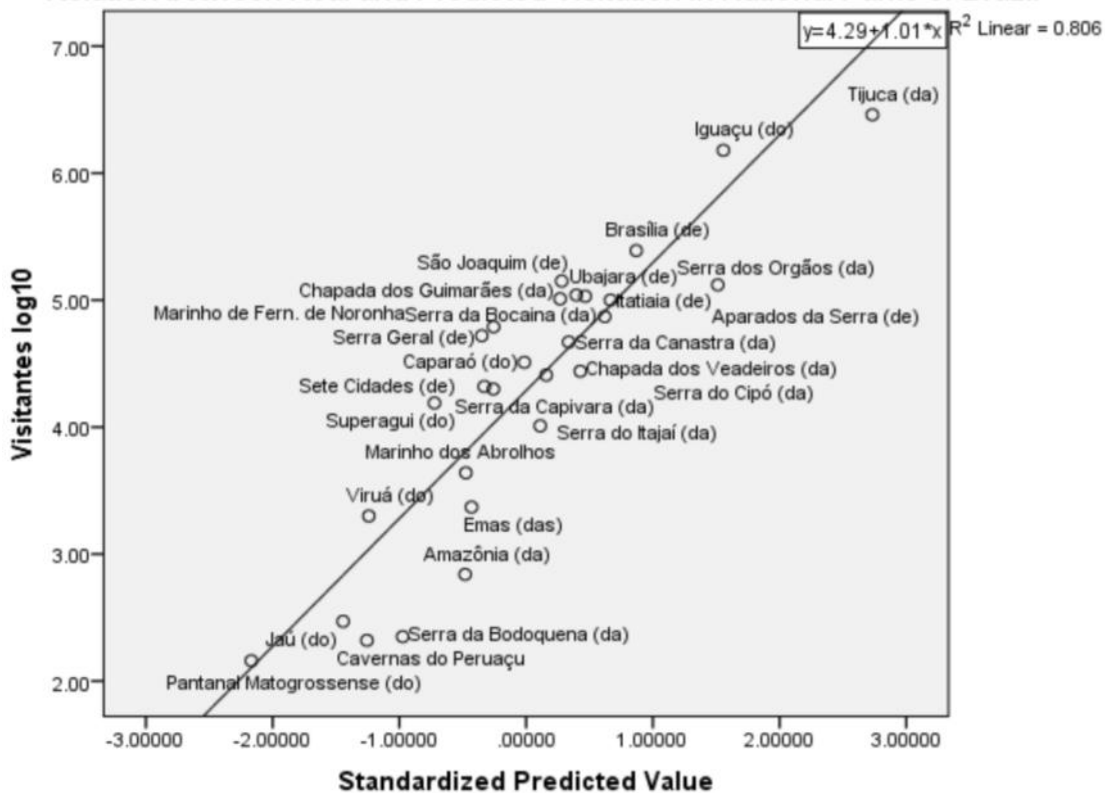


Figure 2: Relation between real and predicted visitation in national parks of Brazil

with access conditions were also included (i.e., distance from large cities and airports). Distances and travel time were estimated with Google Maps.

Data analysis: First, the 13 independent variables were analyzed via Pearson’s correlation. Second, only the significant correlated variables ($p < 0.05$) were included in a stepwise multiple regression analysis. A backward elimination method was employed whereby the deletions of specific input variables were conducted in order to improve the overall model (Cooper & Schindler, 2011; Zar, 1999). Since the dependent variable did not have a normal distribution, a log transformation was used during the regression analysis. In addition, the following variables were also log transformed: park reputation, regional attractions, hospitality establishments, remoteness, local population, and population density. The assumptions of linearity, independence of errors, homoscedasticity, unusual points, and normality of residuals were also met (Hair, 2010).

RESULTS

Correlation Analysis: Based on the correlation analysis, 10 out of 13 independent variables established significant relationships with the dependent variable. The three variables that lacked statistical significance were planning tools, land tenure, and local population. Among internal attributes, park reputation and age, diversity of activities, recreation facilities and visitor services were all statistically significant. Essentially, the results demonstrated that higher levels of visitation were the result of natural beauty and the availability of a wide spectrum of recreational opportunities, amenities, and associated services.

Based on the external setting variables, regional attractions, hospitality establishments, population density and remoteness also established significant correlations, which indicated that parks located in established destinations, densely populated regions or

with easier access receive higher visitation. Finally, the socioeconomic context was also statistically significant since visitation correlated to travel expenditures (see Table 3).

Regression Analysis: Based on the results of the stepwise multiple regression analysis, four variables were identified in the best fit model to predict visitation numbers: 1) park reputation (internal setting – physical attribute), 2) recreation facilities (internal setting – managerial attribute), 3) regional attractions (external setting – physical attribute), and population density (external setting – social attribute). Overall, these variables had significant contributions to the model and explained 77 per cent of the variance in visitation numbers ($F = 23.831$, $p < .0005$, $\text{adj. } R^2 = 0.772$) (Table 4).

Among the four variables, park reputation was the strongest predictor with an increase of 1 per cent in reputation resulting in a surge of 0.56 per cent in visitation. Similarly, an addition of one recreation facility in the park infrastructure relates to an increase of 0.11 per cent in visits. Among the external setting variables, regional attractions were also a strong predictor as an addition of 1 per cent in new attractions yields an increase in visits of 0.55 per cent. The other variable, population density, also demonstrated predictive validity as an increase in 1 per cent in density within a buffer zone of 100 km around the park increases visitation by 0.28 per cent.

In addition, a graphic illustration of the visitation predictions compared with the observed number of visits was formulated. The graph presents a best fit line and shows that the parks were fairly close based on the model. The diagram demonstrates that, at different levels, all parks were sensitive to the chosen variables via the regression analysis. Hence, the model could be a reasonable representation of tourism attractiveness of the national parks in Brazil (see Figure 2).

DISCUSSION

This exploratory study assessed the relative importance of various internal and external park characteristics in relation to the number of visitors. The variables selected to explain visitation rates were park reputation, recreation facilities, regional attractions, and population density. The results show a similarity with Deng et al. (2002) as they used an expert panel methodology and identified variables such as resources, accessibility, facilities, local community, and peripheral attractions. Despite the different variables used in the model, this study also corresponds with the segmentation categories



Fernando de Noronha National Park © Ernesto V Castro

adopted by Neuvonen et al. (2010). Both models contain variables that represent the natural characteristics, recreation and tourism services, spatial demand, and socioeconomic characteristics of local municipalities.

Results suggested that reputation is a major variable that influences choice for park visitation as well-known areas tend to have higher demands. For example, Tijuca and Iguacu National Parks are collectively responsible for 74 per cent of all visitation in 2013 (ICMBio, 2014). This is consistent with the findings of several authors (Crouch & Ritchie, 1999; Lee et al., 2010) that have noted that natural attractions are the primary elements of destination appeal. Given the importance of a park's reputation, which can be propelled by the media, social media, and user-generated content, the results indicate that communication is an important aspect for planning strategies. Park managers need to understand concepts such as destination image and formulate marketing initiatives accordingly to inform their appropriate visitor audience (King et al., 2012).

Two external variables, regional attractions and population density were key predictor variables of visitation. Visitation tends to be higher in higher destination areas with several attractions and within the

most populated regions of a country. As Deng et al. (2002) found, the relationship between national park visitation rates and the existence of other close attractions demonstrates that the average tourist often visits more than one destination during a given trip. There are two national parks in Brazil that provide a good comparison: Brasília (Federal District) and Serra da Capivara (State of Piauí). Brasília, the third most visited national park in 2013 (248,000 visitors) is located inside the capital city of Brasília which has hundreds of other attractions, while Serra da Capivara receives less than 20,000 visitors per year largely due to its isolated location. Additionally, a substantial number (2.4 million) of city inhabitants of Brasília use the park daily for exercise, including the natural swimming pools and other recreational areas. Conversely, Serra da Capivara is home to 300,000 people that live less than 100 km from the park.

There was one significant negative correlation with park visits: remoteness. Geographically isolated areas tend to have fewer visitors. This finding is in accordance with other authors who state that accessibility is a critical dimension of a destination (Kim et al., 2003; Lee et al., 2010). Prideaux (2000) highlights the importance of transport infrastructures and offers an example of Cairns in Australia, where the construction of an international airport had led to a rapid growth in tourism. This finding may be an indication that, to improve accessibility to the protected areas, Brazil should invest more in infrastructure. A notable example is the case of Serra da Capivara National Park (see above) where locals have been demanding an airport to be built for years.

Another aspect to be considered in regards to geographically isolated parks (such as Pantanal in the state of Mato Grosso do Sul), or parks requiring access by river (such as Jaú in the state of Amazonas), is that they tend to be visited only by specialized segments, such as birdwatchers. It is also important to consider that the difficulty of access and the expectation of solitude makes some areas more attractive for these specific visitor segments. For these audiences, the number of visitors and accessibility are inversely proportional to the quality of experience (Iatu & Bulai, 2011). The location of each park should be considered when planning a protected area unit as well as the whole network. It is desirable to have areas, zones and activities designed to offer the widest possible spectrum of recreation opportunities.

The availability of recreational facilities is also a strong factor that influences visitation. For example, visitors tend to prefer more structured parks with visitor centres, boardwalks, and paved internal roads. This result

corroborates with findings in other countries (Kim et al., 2003; Neuvonen et al., 2010; Puustinen et al., 2009). Similarly, this is the case for São Joaquim National Park, which has a paved road maintained by the Army for access to a research facility. Although the park has few recreation options, it received more than 139,000 visitors in 2013 largely due to the scenic mountain road. Conversely, Serra do Itajaí National Park (State of Santa Catarina), located in the city of Blumenau (300,000 inhabitants), and very close to the capital of the State, Florianópolis (460,000 inhabitants), registered few visitors in the same year (10,000) due to the lack of facilities.

Brazilian Parks also show a significant positive correlation between the availability of recreation services and the number of visits. This result corroborates with Puustinen et al. (2009) as they found that parks with more recreation services attract additional visitors. In Brazil, with the exception of Fernando de Noronha National Park (State of Pernambuco), an island with strong carrying capacity restrictions, a few parks that have consistent tourism concessionaires are among the most visited (Tijuca, Iguaçu and Serra dos Órgãos). The findings are also comparable with the Finnish parks (Neuvonen et al., 2010) with respect to the positive correlation of visits and diversity of activities. A relevant example in Brazil is Bocaina National Park (State of Rio de Janeiro) which has several different ecosystems (e. g., mountains and beaches) and can offer a wider spectrum of recreation opportunities for different visitor profiles and interests.

While a positive correlation existed between visitors and park age, it was not selected within the model. Despite the fact that several studies have identified a positive influence of park age over demand (Mills & Westover, 1987; Hanink & White, 1999; Neuvonen et al., 2010), it is not certain how this variable affects demand. While the most outstanding attractions of a country are primary designated protected areas, older parks have had more time to be structured (e.g., facilities, staff, services) and develop their reputation. Hence, this variable appears to have high correlations with others such as reputation and facilities.

Of note is the land tenure and planning tool variables that did not account for any significant relationships. These variables were included in the scope of the study due to the approach by which some parks have been managed for decades in Brazil. According to the traditional approach, the government acquired all the land and prepared the necessary planning tools prior to outdoor recreation uses. However, these procedures have



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been time consuming as the government has not been able to carry out large scale implementation. In some cases, parks have had unresolved land tenure issues for more than 70 years (e.g., the first Brazilian National Park, Itatiaia – State of Rio de Janeiro, established in 1937). Nevertheless, this issue did not prevent almost 100,000 visitors in 2013. While some parks have outdated general management plans that are more than 30 years old, others do not yet have a plan. This finding may indicate that, despite the debate about the steps needed to fully implement a protected area, public use still occurs in parks with or without land tenure or planning tools. During the protected area creation process, especially for national parks, one of the arguments used to garner support from the residents is the positive economic impacts of tourism (Moisey, 2002). However, what normally happens in Brazil is the prohibition of any public activity following the designation, including pre-existing activities. That positioning has created more opponents than supporters of conservation. São Joaquim National Park (State of Santa Catarina) was created in 1959 and lacks a general management plan, and hence ICMBio officially considers the park not able to host visitors. However, despite the official status, the park has been visited consistently. The results support the view that this strategy, while historically adopted, has been shown to be inefficient.

Moreover, it reinforces the actions taken by ICMBio in recent years to regulate, rather than ban activities in parks (ICMBio, 2012).

CONCLUSION

The study demonstrated that tourism attractiveness in the national parks of Brazil were correlated to reputation; linked to recreation facilities; and related to attractions in the region and population density. Results show that both internal park attributes and external setting characteristics are considered by visitors. While management and communication policies are important, external factors that are not directly dependent on park agencies also play a part. In this sense, outreach initiatives by managers at the local and regional scales are recommended, as parks are generally considered within the context of an overall destination. Additionally, joint actions with other government agencies and the tourism trade are critical to increase visitor flow to the national parks and adjacent communities.

This model has practical utility and can be used to improve investment efficacy among the parks that already receive visitors, as well as serve to evaluate the tourism attractiveness of new parks. Also, the findings may be useful for communities and small businesses located in the adjacent areas, since adequate prediction



Tijuca National Park © Ernesto V Castro

of visitor demand provides support for tourism activities. While the sample in this study was small, the analyses provide a platform to further build on this research with respect to the relative importance of different attributes that may attract visitors to the national parks in Brazil. It should also be noted that this study relied on number of visitors as an indicator of performance, which covers just one of the goals of tourism in parks. Quality of visitor experience and satisfaction are other essential elements to increase public awareness of the importance of conservation and raise support for protected areas.

FOOTNOTES

[1] Data could not be segmented by international and domestic visitors due to the lack of reliable and accurate data collection by ICMBio. However, it was assumed that the majority represented domestic visitors. In addition, a few parks such as Tijuca National Park charge fees for attractions (e.g., Christ the Redeemer) but only count visitors for other locally used areas (e.g., running trails). In such situations, this study incorporated visitor counts regardless of fees paid.

[2] Studies have increasingly utilized the Google search engine as a research tool in various disciplines including tourism (see Mazanec, 2010; Murphy & Law, 2008).

[3] Official language of Brazil.

[4] User-generated content websites such as TripAdvisor are gaining more credibility from the travelling public and academia (see Ayeh et al., 2013).

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REFERENCES

- Ayeh, J. K., Au, N. and Law, R. (2013). Do we believe in TripAdvisor? Examining credibility perceptions and online travelers' attitude toward using user-generated content. *Journal of Travel Research*, 52(4), 437-452. DOI:10.1177/0047287512475217
- Clark, R. and Stankey, G. (1979). The Recreation Opportunity Spectrum: A Framework for Planning, Management, and Research. U.S. *Department of Agriculture – Forest Service Research paper PNW-98*. USDA Forest Service.
- Cooper, D. R. & Schindler, P. S. (2011). *Business research methods*. New York: McGraw-Hill/Irwin series.
- Crouch, G. I. and Ritchie, J. R. B. (1999). Tourism, competitiveness, and societal prosperity. *Journal of Business Research*, 44(3), 137-152. DOI:10.1016/S0148-2963(97)00196-3
- Deng, J., King, B. and Bauer, T. (2002). Evaluating natural attractions for tourism. *Annals of Tourism Research*, 29(2), 422-438.
- Eagles, P. and McCool, S. (2002). *Tourism in National Parks and Protected Areas: Planning and Management*. Wallingford, UK: CABI.
- Emerton, L., Bishop, J. and Thomas, L. (2006). *Sustainable financing of protected areas: A global review of challenges and options*. Gland, Switzerland: IUCN.
- Gearing, C. E., Swart, W. W. and Var, T. (1974). Establishing a measure of touristic attractiveness. *Journal of Travel Research*, 12(4), 1-8. DOI: 10.1177/004728757401200401
- Hair, J. F. (2010). *Multivariate data analysis*. Upper Saddle River, NJ: Prentice Hall.
- Hanink, D.M. and White, K. (1999). Distance effects in the demand for wildland recreational services: The case of national parks in the U.S. *Environment & Planning*, 31(3), 477-492. DOI: 10.1068/a310477
- Hu, Y. and Ritchie, J.R.B. (1993). Measuring destination attractiveness: A contextual approach. *Journal of Travel Research*, 32(2), 25-34. DOI: 10.1177/004728759303200204
- Iatu, C. and Bulai, M. (2011). New approach in evaluating tourism attractiveness in the region of Moldavia (Romania). *International Journal of Energy and Environment*, 2(5), 165-174.
- ICMBio. (2012). Relatório de Gestão de 2011 [Trans. Administrative Report 2011]. Brasília: Chico Mendes Institute for Biodiversity Conservation.
- ICMBio (2014). Visitor Numbers in Protected Areas. General Coordination of Public Use and Business CGEUP (internal document), Brasilia.
- Kim, S.S., Lee, C. K. and Klenosky, D. B. (2003). The influence of push and pull factors at Korean national parks. *Tourism Management*, 24(2), 169-180. DOI:10.1016/S0261-5177(02)00059-6
- King, L., McCool, S., Fredman, P. and Halpenny, E. (2012). Protected area branding strategies to increase stewardship among park constituencies. *PARKS*, 18(2), 55-64. DOI:10.2305/IUCN.CH.2012.PARKS-18-2.LMK.en
- Laws, E. (1995). *Tourism destination management: Issues, analysis, and policies*. New York: Routledge.
- Lee, C., Huang, H. and Yeh, H. (2010). Developing an evaluation model for destination attractiveness: Sustainable forest recreation tourism in Taiwan. *Journal of Sustainable Tourism*, 18(6), 811-828. DOI: 10.1080/09669581003690478
- Manning, R. E. (2011). *Studies in Outdoor Recreation: search and research for satisfaction*. 3rd Edition. Corvallis, OR: Mazanec, J. A. (2010). Tourism-receiving countries in connotative google space. *Journal of Travel Research*, 49(4), 501-512. DOI:10.1177/0047287509349269
- Mills, A. S. and Westover, T. N. (1987). Structural differentiation. *Annals of Tourism Research*, 14(4), 486-498.
- Moisey, R. N., (2002). The Economics of Tourism in National Parks and Protected Areas. In: P. F. J. Eagles and S. McCool, *Tourism in national parks and protected areas: planning and management*, pp. 235-253. New York: CABI Publishing.
- Mulholland, G. and Eagles, P. (2002). African parks: combining fiscal and ecological sustainability. *PARKS*, 12(1), 42-49.
- Murphy, J. and Law, R. (2008). Google scholar visibility and tourism journals. *Annals of Tourism Research*, 35(4), 1078-1082.
- Neuvonen, M., Pouta, E., Puustinen, J. and Sievänen, T. (2010). Visits to national parks: Effects of park characteristics and spatial demand. *Journal for Nature Conservation*, 18(3), 224-229. <http://dx.doi.org/doi:10.1016/j.jnc.2009.10.003>
- Prideaux, B. (2000). The role of the transport system in destination development. *Tourism Management*, 21(1), 53-63. [http://dx.doi.org/10.1016/S0261-5177\(99\)00079-5](http://dx.doi.org/10.1016/S0261-5177(99)00079-5)
- Puustinen, J., Pouta, E., Neuvonen, M. and Sievaenen, T. (2009). Visits to national parks and the provision of natural and man-made recreation and tourism resources. *Journal of Ecotourism*, 8(1), 18-31. DOI: 10.1080/14724040802283210
- Thapa, B. (2013). Introduction to the Special Issue – Managing protected areas: Global perspectives, Volume 1. *Journal of Park and Recreation Administration*, 31(2), 1-5.
- Thapa, B., Parent, G., Mupeta, P. and Child, B. (2011). *Zambia Tourism Demand Assessment*. Washington, DC: US Millennium Challenge Corporation and US Department of Agriculture-Foreign Agricultural Service.
- Weiler, B., Moore, S. and Moyle, B. (2013). Building and sustaining support for national parks in the 21st century: why and how to save the national park experience from extinction. *Journal of Park and Recreation Administration*, 31(2), 115-131.
- Wood, S., Guerry, A., Silver, J. and Lacayo, M. (2013). Using social media to quantify nature-based tourism and recreation. *Scientific Reports*, 3, 2976. DOI:10.1038/srep02976

RESUMEN

La comprensión de los factores determinantes que afectan el atractivo turístico de los parques nacionales es un instrumento de planificación estratégica para las áreas protegidas. Este estudio exploratorio evaluó la importancia relativa de las diversas características internas y externas de los parques en función del número de visitas en Brasil. Se recolectó información de varias fuentes: administradores de 28 parques, documentos internos de los parques, bases de datos gubernamentales y diversos sitios web. El estudio utilizó análisis de correlación y regresión. Los resultados demostraron que el atractivo turístico en los parques nacionales se puede predecir a través de la reputación, las instalaciones de esparcimiento, lugares de interés en la región y densidad de población. Los resultados revelan que los visitantes consideran tanto los atributos internos del parque como las características externas del entorno. Los resultados tienen utilidad práctica y pueden ser utilizados para mejorar la eficacia de las inversiones entre los parques que ya reciben visitantes, así como para evaluar el atractivo turístico para nuevos parques. Los resultados también son útiles para las comunidades y las pequeñas empresas ubicadas en las zonas adyacentes, habida cuenta de que la predicción adecuada de la demanda de visitantes proporciona apoyo a las actividades turísticas.

RÉSUMÉ

Comprendre les attributs déterminants qui affectent l'attractivité touristique des parcs nationaux est déterminant pour la planification stratégique des aires protégées. Cette étude exploratoire a évalué l'importance de divers éléments internes et externes aux parcs au Brésil sur le nombre de visites. Des données ont été recueillies à partir de plusieurs sources: 28 gestionnaires de parc, des documents internes au parc, des bases de données gouvernementales et divers sites Web. L'étude est basée sur une analyse de corrélation et de régression. Les résultats ont démontré que l'attrait touristique des parcs nationaux dépendait de facteurs liés à la réputation, aux équipements récréatifs, aux infrastructures de la région et à la densité de la population. Les résultats montrent que les visiteurs prennent en compte les attributs internes et externes aux parcs. Ces résultats présentent un réel intérêt pratique susceptible non seulement d'améliorer l'efficacité des investissements dans les parcs qui reçoivent déjà des visiteurs, mais aussi de servir à évaluer l'attrait touristique de nouveaux parcs. De plus, les conclusions sont utiles pour les communautés et les petites entreprises situées dans les régions adjacentes, puisque une prédiction adéquate de la demande touristique constitue un soutien aux activités de tourisme.



BUFFER ZONE MANAGEMENT ISSUES IN CHITWAN NATIONAL PARK, NEPAL: A CASE STUDY OF KOLHUWA VILLAGE DEVELOPMENT COMMITTEE

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ABSTRACT

Buffer zone management in Chitwan National Park is regarded as a successful programme in Nepal. However, buffer zones are typically treated as a homogeneous entity without much regard to the intra-zone dynamics. This research examined the impacts of rhinos along with households' resource use, dependency, involvement and associated impacts within one buffer zone – Kolhuwa Village Development Committee. Household surveys (N=68) were conducted and sampling was based on the type of settlement and land size. A structured and semi-structured questionnaire was used to interview household heads along with GPS points. The buffer zone was segmented into two zones – Close and Far Settlement based on the distance from the park boundary. Results illustrated that the impacts of rhinos were more pronounced among households that were closer to the boundary, and declined with increasing distance. Households had challenges to produce enough food for at least six months to a year, but noticeably more so in the close settlements. Residents that were closer to the boundary were most dependent on fuelwood and natural resources extraction. While both zones were reliant on income from outside their community, households in the close settlements were more dependent. Conversely, households in the far settlements had been involved for more years and in more activities in the buffer zone. Results are of utility to park management with respect to zoning designations.

Key words: People-Park conflict, resource use, rhinos, livelihoods, GIS, park management

INTRODUCTION

The buffer zone concept was developed by United Nations Organization for Education, Science and Culture (UNESCO) to provide an additional layer of protection around protected areas as well as to balance the development needs of the local people and conservation objectives of protected areas (Bajracharya, 2009). The creation of buffer areas encourages both sustainable extractive uses and public participation in protected areas management through decentralization of natural resource use along with financial and technical support to the user groups (Wells & Brandon, 1993). This opportunity to meet the dual goals of conservation and poverty reduction has generated major interest among governments, and has resulted in global implementation around protected areas (Parker & Thapa, 2012).

In Nepal, the buffer zone concept has been adopted as a national strategy to address the issues between parks and adjacent communities to ensure an optimal balance between the long-term conservation objectives and immediate needs of local residents (DNPWC, 1996). The major goal of the buffer zone programme is to involve and seek support from local communities for nature and wildlife conservation. The buffer zone management programmes have been widely implemented and have two major objectives: 1) to improve the management of the natural resources in the buffer zones; and 2) to improve ecological conditions in the buffer zones which offer an extended habitat for wildlife. In order to accomplish both objectives, the buffer zone areas serve to increase access to natural resources (e.g., non-timber forest products) in order to be sustainably harvested by



Local villagers returning from collecting fodder from the buffer zone of Chitwan National Park © Michel Gunther / WWF

the communities that reside within it, thereby reducing the pressure in the protected areas. Although buffer zone user groups are allowed to harvest the forest products from the assigned community forests, they are not permitted to sell them (New Era, 2004). Also, in comparison to the community forests outside the buffer zone, there are greater restrictions within the buffer zone area, as the primary objective of the community forest in the buffer zone is to improve biodiversity for wildlife habitat restoration (Bhusal, 2014).

Additionally, legislation has provided for a benefits-sharing mechanism for implementation of conservation and community development programmes related to institutional development, alternative natural resource development, capacity building, financial management, conservation education and awareness, and gender and special target group mainstreaming (DNPWC, 1996; DNPWC, 2015). Overall, the application of buffer zones has demonstrated utility and success but has also borne conflicting priorities between conservation and development goals. Furthermore, buffer zone policy has also been perceived to be coercive by some local community residents given the top-down managerial structure (Heinen & Mehta, 2000).

Among the various units within the protected areas system in Nepal, the first national park (Chitwan – established in 1973) has extensively utilized buffer zone programmes as a key conservation and management strategy. The case for a buffer zone approach was evident in Chitwan National Park (CNP) as threats to biodiversity conservation had continued to exist in numerous forms and at different scales (Budhathoki, 2005). People-park conflict had also been an ongoing issue due to the wildlife impacts in adjacent communities. Also, local community members had continued to ignore regulations and were engaged in extractive behaviours as well as grazing their cattle inside the park (Nepal & Weber, 1995; Sharma, 1991). In order to mitigate conflicts, a total of 34 Village Development Committees (VDCs¹) and two municipalities with households adjacent to the park were declared as buffer zones in 1996. The total area designated as buffer zones around the park was 750 km² (DNPWC, 2015). Along with its establishment, the buffer zone communities and user groups have been allocated a disbursement of 30–50 per cent² of the park revenues for community development and natural resources management programmes (DNPWC, 1996; DNPWC, 2015). The money is allocated for different categories: conservation (30 per cent), community development (30

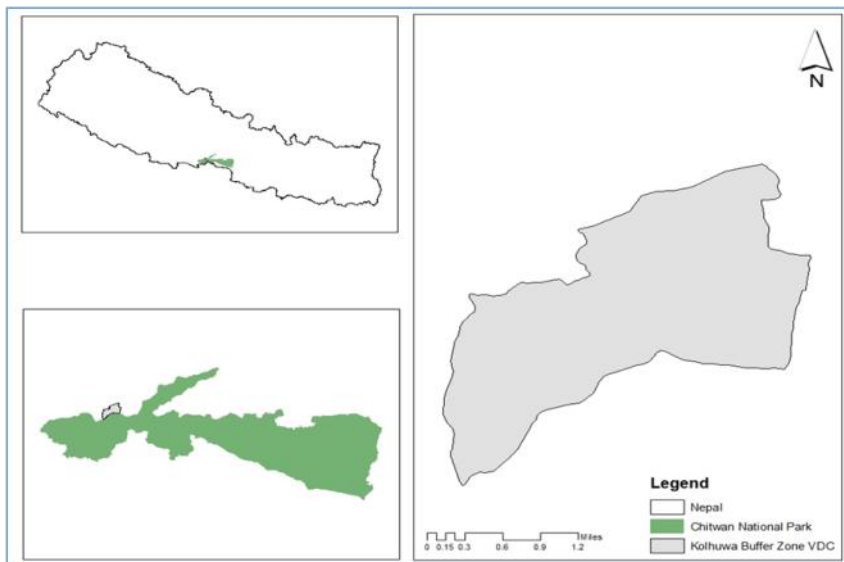


Figure 1: Study area

per cent), income generation and skills development (20 per cent), conservation education (10 per cent), and administration (10 per cent) (DNPWC, 2015).

CNP is a major site for conservation of wild habitats of several endangered wildlife species. The park was inscribed as a UNESCO World Heritage Site in 1984, and is located in the relatively flat and low lying Terai region (south-central Nepal) with a tropical and sub-tropical climate. The park encompasses 932 km² and is an important habitat for flagship faunas including tigers (*Panthera tigris*), elephants (*Elephas maximus*) and the one horned Rhinoceros (*Rhinoceros unicornis*), which is supported by the mixture of alluvial grasslands and riverine forests (Bhattarai & Kindlmann, 2011).

The establishment of the park has resulted in a substantial increase in the rhino population from 147 to 544 by 2000 (Adhikari, 2002), and 605 in 2015 (NTNC, 2015). While success has been evident, the rhinos are still endangered largely due to human-induced activities such as hunting and poaching. Given the monetary value of the rhino horn which is alleged to have medicinal properties, poaching is a major issue for CNP management. In fact, every community settlement within and outside the buffer zones is a potential shelter for rhino poachers (Adhikari, 2002). It has been reported that more than 60 per cent of the people involved in poaching activities live within or in the vicinity of the park/buffer zones (Lamsal, 2012). Also, all the rhino habitats lie adjacent to the buffer zone settlements, hence are vulnerable (Adhikari, 2002). Furthermore, rhino habitat has been under threat due to the demand for agricultural cultivation and cattle grazing (Lamsal, 2012).

Concomitantly, the buffer zones communities also experience varying levels of impacts due to rhinos and

other wildlife incursions. Most notably, the impacts are related to crop damage, livestock depredation, and loss of human life which have all perpetuated people-park conflict issues. Crop raiding along with human attacks by rhinos in the buffer zones have been a major issue which has led to defensive retaliation by the locals (Bajracharya, 2009; Budhathoki, 2005). While impacts have been borne by the local communities, not all buffer zones are equally affected by rhinos and/or other wildlife. Recent research has identified that residents that live within 2 km of the park's boundary reported more crop damage by rhinos than other wildlife (Lamsal, 2012). Such findings indicate that rhinos' mobility is concentrated in areas outside the park's boundary within buffer zone communities. However, further research is needed to examine mobility and impacts as noted by residents within the buffer zone communities.

In addition to the rhino impacts, the buffer zone communities are strongly tied to the park – environmentally (i.e., resources) and economically (i.e., tourism). While the park's management is engaged in revenue sharing and regulation compliance via the buffer zone management committees, the demand and dependency for fuelwood and other natural resources extraction has been an ongoing issue. Such issues have been consistently assessed as demonstrated by recent research in the buffer zone communities which has focused on residents' attitudes, perceptions, resource use and dependency issues (Lamsal, 2012; Nepal & Spiteri, 2011; Nyaupane & Poudel, 2011). Though there is a need for further research with respect to locals' use and impact assessment within and between the buffer zones and respective communities.

The buffer zone in CNP has been divided into three basic sectors: conservation, sustainable use, and intensive use

Table 1: Zonation of buffer zone areas

Zone	Proximity	No. of sampled Households	Distance from the Park Boundary
Zone 1	Close Settlement	30	<1100 m
Zone 2	Far Settlement	38	>1100 m

(DNPWC, 2015). Although these zones are operational, the park's management plan also has a reactive approach whereby future prioritization is based on the severity of contemporary issues. Since buffer zones are not a homogeneous entity given the varying degrees of community impacts as well as proximity of the settlements to the park's boundaries, additional research about the impacts of rhinos and related households' assessment will be of utility to management. Therefore, the objectives of this study were twofold and were based among households within a single buffer zone: 1) to examine the distribution of rhino impact; and 2) to assess resource use, dependency, involvement, and associated impacts.

METHODS

Study area

Among the 36 VDCs and municipalities assigned as buffer zones for CNP, the Kolhuwa Buffer Zone Village Development Committee (BZ-VDC) was chosen for this study since it has no forests. The lack of a forest has been a challenge given that households have to seek alternative sources for fuelwood. The Kolhuwa BZ-VDC is part of the Kolhuwa VDC which has a total area of 1,614.7 ha. The Kolhuwa BZ VDC is 1,052.4 ha and lies in the western sector of the park (PPP, 2000). The majority of the residents are Tharus who are indigenous and have predominantly lived in the Terai (lowlands plains) region. The community is culturally vibrant, and agriculture is the main occupation with wheat, maize, rice and sugarcane as the major crops cultivated.

Data collection

Household surveys were conducted in the study area. Sampling was based on the type of settlement (small, mid, large), and land size (landless, small farm, medium farm, big farm, large farm) (DNPWC, 2000). This process of categorization provided an opportunity to collect data from households with varying socio-economic status within the specific buffer zone communities. Based on the settlement type and land size, a total of 68 households were selected randomly within each specific cluster.

Table 2: Operationalization of variables

Variables	Operationalization
Rhino incursion	Households impacted by rhino in their field per year
Rhino frequency	Frequency of rhino visits by month – either in their field or their home per year
Food deficit	Households that cannot produce enough food for at least six months to a year
Fuelwood	Total tonnes of fuelwood needed by household per year
Natural resources extraction	Households that extract fuelwood and fodder from the park
Remittance dependency	Households with income sources outside the village
Buffer zone involvement	Household family member involvement in buffer zone activities
Years involved in buffer zone	Number of years in which a household family member has been either a member of a buffer zone user group or user committee
Land owned	Total land owned by household
Income	Total household income per year

A structured and semi-structured questionnaire was used to interview the head of the households. The questionnaire comprised three sections: household information, buffer zone activities, and wildlife depredation issues. Pilot testing of the instrument was conducted and minor adjustments were made prior to data collection. Given the high rate of illiteracy, the interviewer read the questions to the participants at their respective home, and completed it accordingly. The age range for the household head was between 25 and 60 years. The interviews were conducted in Nepali and responses were translated into English. The translations were verified prior to statistical analysis. Also, GPS points for each sampled household were collected using Garmin eTrex GPS.

Data analysis

First, the buffer zone was segmented into two different zones based on the distance from the boundary of the park. The zoning was conducted via buffer analysis in ArcGIS 10.1. The width of the layer was fixed at 1100 m so as to divide the buffer zone into two equal parts. Zone 1 comprised 30 sampled households and was labelled as

Table 3: Comparison between two zones

Variables	Close Settlement Zone 1	Far Settlement Zone 2	Test Statistic	P value
Rhino incursion (%)	58.3	34.4	5.689	0.028**
Rhino frequency (months/yr/household)	7.08	1.97	246	0.000***
Food deficit (%)	73.33	47.37	5.442	0.022**
Fuelwood (tonnes/yr/hh)	1.80	1.48	416	0.039**
Natural resources extraction (%)	70.0	21.05	16.421	0.000***
Remittance dependency (%)	76.67	39.47	9.407	0.002***
Involvement in buffer zone (%)	40.00	65.79	4.495	0.034***
Number of years involved in buffer zone	2.30	4.20	738	0.037**
Land owned (ha/hh)	0.56	0.74	651	0.356
Income (USD/yr/hh)	825.3	930.2	638.5	0.442

Legend: ***: significant at 0.01 level; **: significant at 0.05 level

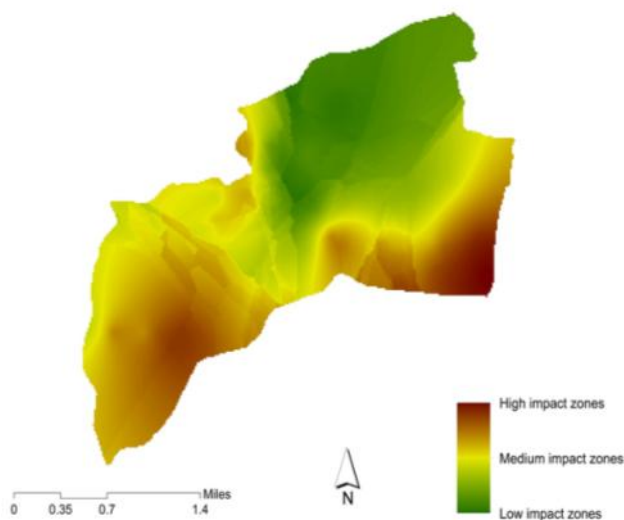


Figure 2: Impact of Rhinos in the Kolhuwa Buffer Zone

Close Settlement, while Zone 2 consisted of 38 households and was recorded as *Far Settlement* (see Table 1).

For research question #1, the impacts of rhinos among the households were assessed by the amount of crop loss and the monthly frequency of rhino incursions into the area. Spatial analysis using ArcGIS 10.1 was conducted to assess household impacts, and subsequently the results were interpolated through Kriging analysis to identify impacts in the whole study area. For research question #2, comparative analyses of sampled households between the two zones were conducted based on the following variables: rhino impacts, frequency of rhino incursions, food deficit, fuelwood demand, natural resources extraction, remittance dependency, involvement and years served in buffer zone user groups and committees, land owned, and income (see Table 2). For statistical analyses, normality tests were administered for the tested variables. Since the data were

identified to be skewed, non-parametric analysis was conducted. Mann-Whitney U test was used for the scale data while Chi-square analysis was used for the categorical data.

RESULTS

Research question#1

The analysis identified that the impact of rhinos was correlated to the distance of the sampled households from the park's boundary. The impacts were more pronounced among households that were closer to the boundary, and declined with increasing distance from the park. The mobility of rhinos outside the boundary was evident with a higher traffic concentration due to the proximity of the Narayani River's flood plain. Hence, households that were located in the flood plain were more susceptible to impacts due to rhino mobility. The degree of household impacts based on both settlement types is illustrated based on a spatial analysis in Figure 2.

Research question#2

Based on a comparative analysis between the sampled households in the two zones, the impacts were more prominent for Zone 1. The frequency of rhino incursions and impacts were substantially higher and was likely the result of settlements' location in the flood plain. Food deficit was higher for Zone 1 households, but was also an issue for households in Zone 2. Basically, the sampled households in both zones had challenges to produce enough food for at least six months to a year. In addition, the households in Zone 1 which were closer to the park boundary were most dependent on fuelwood and natural resources extraction from the park. While both zones were reliant on sources of income from outside their community (i.e., remittance), Zone 1 households were more dependent. Conversely, households in Zone 2 had been involved for more years as well as in specific



Rhino in Chitwan National Park © Equilibrium Research

activities in the buffer zone. Of all the measured variables, only two failed to reach statistical significance – land owned, and income (see Table 3).

DISCUSSION

Buffer zone management in CNP is regarded as a successful programme in Nepal. This research examined the impacts of rhinos along with households' resource use, dependency, involvement and associated impacts within one buffer zone. This specific buffer zone was chosen due to its rural characteristics, lack of a community forest, and does not have any commercial tourism activities. Results identified differences in impacts and benefits accrued in the two segmented settlements (close and far) within the buffer zone. Rhino movements were noted to occur in the buffer zone and were concentrated closer to the park boundaries. Such movements were also reported especially at night by almost two-thirds of residents sampled in 16 buffer zones and two municipalities (Lamsal, 2012). In this study, households in Zone 1 were most affected especially with respect to crop loss that resulted in food insecurity. However, given the proximity of the flood plain from the park boundary, the mobility of rhinos is unlikely to decrease. Since impacts to agriculture and livelihoods have been noted to be a regular occurrence, it might be worth exploring the idea of voluntary community resettlement. Such resettlement programmes have been implemented, and recent research has identified that residents are recorded to have improved their economic and social ties in their new location (Dhakal et al., 2011). However, a participatory planning approach along with fair compensation and access to basic needs such as

water, health, and education facilities would be essential to determine success in voluntary relocation initiatives (Dhakal et al., 2011).

Residents within the buffer zone were largely dependent on the park for natural resources basically due to the lack of access to a community forest which is common in other zones. The proximity to the park boundary and ease of access likely resulted in resources utilization, especially among those from closer settlements (Zone 1). Resource dependency and exploitation among residents in two other buffer zones has been previously identified (Stræde & Treue, 2006). In fact, such use and dependency was also recently noted among those that lived closer to the park boundaries in multiple buffer zones (Lamsal, 2012). Overall, illegal resources extraction from the national park has been a constant managerial issue for park authorities. Moreover, intensive removal of trees for timber is a growing concern as anecdotal reports have reported multiple illegal saw mills in operation in various communities. In addition, timber harvesting has also created opportunities for poachers to survey areas for potential animals, including the rhino. To combat illegal extractive use and dependency, there has to be alternative sources of fuelwood offered to community residents. A viable alternative by the government has been to offer free and/or highly subsidized biogas, but the programme lacks major dissemination especially among those close to the park boundaries.

While the impacts were more prominent for residents located in Zone 1, they were also significantly less

involved in buffer zone activities such as user group and/or committee members. Additionally, those who were involved had slightly more than two years of experience in comparison to an average of over four for those from Zone 2. The lack in the level of engagement and involvement in buffer zone management activities can act as a real impediment to development activities. The park management is required to operate a revenue-sharing programme with respect to community development initiatives, however, the mechanism does not provide for the equitable use of revenues within and between the buffer zones (Gurung et al., 2010). Hence, the importance of representation in buffer zone management activities is central for resource allocation to assist with initiatives in the respective settlements. Nevertheless, the park management needs to have more authority with respect to monetary disbursement to ensure equitable representation in distribution. This process will be essential to build social capital and community trust between the park management and the respective buffer zone community members. Similar to other studies (Abbasi & Khan, 2009; Steinmetz et al., 2014), open dialogue and community engagement will foster stronger ties, and assist in alleviating various illegal practices including poaching and resources extraction.

The average land ownership for residents in the whole buffer zone was 0.64 hectares which was substantially lower than the minimum of 2 hectares required to cultivate food for a single family (Joshi, 1999). Thus, food deficit was an issue for both zones as residents were unable to produce enough food for at least six months to a year, but noticeably more so for residents in Zone 1. Similarly, residents in both zones were dependent and were recipients of remittance, but more so for Zone 1. Remittance is a major driver of the economy and has resulted in more out-migration (within and outside the country) of youth for employment. This issue of youth mobility suggests that employment prospects were generally dismal, but more impactful for Zone 1 residents. Nepal is highly dependent on remittances. In 2009, their value comprised USD 3 billion which is equivalent to 22 per cent of national GDP (World Bank, 2011), but the true value could be even higher (Parker & Thapa, 2012). Remittance is a valued source of household income and can help to increase food security, but at the same time the dependency suggests the failure of the buffer zone programmes to offer development activities. Buffer zone management committees need to conceptualize other innovative development activities such as home-stay tourism, small-scale entrepreneurs, etc. to increase economic activities within the communities.



A local villager in the buffer zone of Chitwan National Park
© Simon de TREY-WHITE / WWF-UK

CONCLUSION

The creation of buffer zones has been beneficial for conservation and for development initiatives in the respective communities. However, buffer zones are typically treated as a homogeneous entity without much regard to the intra-zone dynamics and associated challenges. This study explored the impacts and issues within one buffer zone based on proximity to the park boundary. As results demonstrated, the impacts via rhinos and other issues such as resource use, dependency, and involvement varied based on location of dwelling within the buffer zone. Also, revenue sharing mechanisms along with buffer zone community engagement needs to be further prioritized accordingly. The results should be of utility to park management with respect to zoning designations. However, it is acknowledged that this study only focused on one buffer zone with specific characteristics that may not be applicable to other areas. Additional future research is needed based on comparative analysis of buffer zones with respect to issues such as natural resource dependency, tourism development, local natural habitats (i.e. access to forest and non-forest) etc. Finally, similar to this research, the use of technology such as GIS with social sciences research needs to be further adopted to understand the varying context of the park-people relationship.



Boundary guard post in Chitwan National Park © Equilibrium Research

ENDNOTES

¹VDCs and municipalities are administrative units that are representative of the rural and urban areas respectively.

² Revenue sharing for all national parks was mandated by the government via legislation in 1996.

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REFERENCES

- Abbasi, F. and Khan, A. (2009). Potential of community-based natural resource management to alleviate interlinked problems of poverty and conservation. *ICFAI Journal of Environmental Economics*, 7(2), 49–61.
- Adhikari, T. (2002). The Curse of Success. *Habitat Himalaya*, 9 (3), 1–4.
- Bajracharya, L. (2009). *Biodiversity Conservation in Buffer Zone – Problems and Opportunities: Conservation Practices, Buffer Zone Vegetation and Livelihood Needs in Pithauli VDC, Chitwan National Park, Nepal*. Unpublished masters degree dissertation. Tribhuvan University, Kathmandu, Nepal.
- Bhattarai, B. P. and Kindlmann, P. (2011). Habitat heterogeneity as the key determinant of the abundance and habitat preference of prey species of tiger in the Chitwan National Park, Nepal. *Acta Theriologica*, 57(1), 89–97.
- Bhusal, N. P. (2014). Buffer Zone Management System in Protected Areas of Nepal. The Third Pole: *Journal of Geography Education*, 11, 34–44. DOI: <http://dx.doi.org/10.3126/ttp.v11i0.11558>

- Budhathoki, P. (2005). Royal Chitwan National Park: A World Heritage Site with Buffer Zone. In U. R. Sharma and P. B. Yonzon (Eds.), *People and Protected Areas in South Asia* (p. 177). Resources Himalaya Foundation.
- Dhakal, N., Nelson, K., and Smith, J. (2011). Resident well-being in conservation resettlement: The case of Padampur in the Royal Chitwan National Park, Nepal. *Society and Natural Resources*, 24(6), 597–615.
- Department of National Parks and Wildlife Conservation (DNPWC). (1996). *Buffer Zone Management Rules*. Kathmandu: Department of National Parks and Wildlife Conservation, Nepal.
- Department of National Parks and Wildlife Conservation (DNPWC). (2000). *Royal Chitwan National Park and Buffer Zone Draft Management Plan: 2001-2005*. Kathmandu: Department of National Parks and Wildlife Conservation, Nepal.
- Department of National Parks and Wildlife Conservation (DNPWC). (2015). *Royal Chitwan National Park and Buffer Zone Management Plan: 2013-2017*. Kathmandu: Department of National Parks and Wildlife Conservation, Nepal.
- Gurung, M. K., Khadka, M., and Darjee, K. B. (2010). *Buffer Zone Management Policy Implications on the Livelihoods of Excluded Groups: A study from Chitwan National Park and Parsa Wildlife Reserve, Nepal*.
- Social Inclusion Research Fund – Nepal Social Inclusion Research Fund. Kathmandu: SNV Nepal.
- Heinen, J. T. and Mehta, J. N. (2000). Emerging issues in legal and procedural aspects of buffer zone management with case studies from Nepal. *Journal of Environment and Development*, 9(1), 45–67.
DOI: 10.1177/107049650000900103
- Joshi, S. (1999). *A Socio-Economic Analysis of Residents in the Buffer Zone of Royal Chitwan National Park*. Unpublished Master's thesis. University of Minnesota, Minneapolis, MN.
- Lamsal, S. (2012). *The park-people conflict in the Chitwan National Park with reference to the Asiatic one-horned rhinoceros*. Unpublished Masters' thesis. Norwegian University of Science and Technology, Trondheim, Norway.
- National Trust for Nature Conservation (NTNC). (2006). National Rhino Count 2015: 645 individual rhinos in Nepal. Retrieved 15 July 2015 from <http://www.ntnc.org.np/news/national-rhino-count-2015-645-individual-rhinos-nepal>
- Nepal, S. and Spiteri, A. (2011). Linking livelihoods and conservation: An examination of local residents' perceived linkages between conservation and livelihood benefits around Nepal's Chitwan National Park. *Environmental Management*, 47, 727–738. DOI: 10.1007/s00267-011-9631-6.
- Nepal, S. and Weber, K. (1995). The quandary of local people: Park relations in Nepal's Royal Chitwan National Park. *Environmental Management*, 19(6), 853–866.
- New Era. (2004). Impact assessment of buffer zone programme in Nepal. Kathmandu: New Era.
- Nyaupane, G. and Poudel, S. (2011). Linkages among biodiversity, livelihood, and tourism. *Annals of Tourism Research*, 38(4), 1344–1366. DOI: 10.1016/j.jannals.2011.03.006
- Parker, P. and Thapa, B. (2012). Natural resource dependency and decentralized conservation within Kanchenjunga Conservation Area Project, Nepal. *Environmental Management*, 49(2), 435–444.
- PPP. (2000). Kolhuwa User Committee Profile. Private Public Partnership. Kathmandu: Government of Nepal.
- Sharma, U. R. (1991). *Park-People Conflict in Royal Chitwan National Park, Nepal*. Unpublished doctoral dissertation, University of Arizona, Tucson, AZ.
- Steinmetz, R., Srirattapanorn, S., Mor-Tip, J., and Seuaturien, N. (2014). Can community outreach alleviate poaching pressure and recover wildlife in South-East Asian protected areas? *Journal of Applied Ecology*, 51(6), 1469–1478. DOI: 10.1111/1365-2664.12239
- Stræde, S. and Treue, T. (2006). Beyond buffer zone protection: A comparative study of park and buffer zone products' importance to villagers living inside Royal Chitwan National Park and to the villagers living in its buffer zone. *Journal of Environmental Management*, 78, 251–267. DOI: 10.1016/j.jenvman.2005.03.017
- Wells, M. and Brandon, K. (1993). The principles and practice of buffer zones and local participation in biodiversity conservation. *Ambio*, 22(2/3), 157–162.

RESUMEN

La gestión en la zona de amortiguamiento del Parque Nacional de Chitwan se considera como un programa exitoso en Nepal. Sin embargo, las zonas de amortiguamiento suelen ser tratadas como una entidad homogénea sin mayor consideración a la dinámica intrazona. Esta investigación examinó los impactos de los rinocerontes, junto con el uso de los recursos, la dependencia, la participación de los hogares y los impactos asociados dentro de una zona de amortiguamiento –Comités de Desarrollo de Aldea de Kolhuwa. Se realizaron encuestas a hogares (n = 68) y el muestreo se basó en el tipo de asentamiento y el tamaño del terreno. Se utilizó un cuestionario estructurado y semi estructurado para entrevistar a los jefes de familia junto con los puntos GPS. La zona de amortiguamiento se dividió en dos zonas –Asentamiento Cercano y Lejano según la distancia que los separa del límite del parque. Los resultados mostraron que los impactos de los rinocerontes fueron más pronunciados entre los hogares que estaban más cerca de los límites, y disminuyeron al aumentar la distancia. Los hogares tenían problemas para producir suficientes alimentos durante al menos seis meses a un año, pero de manera más notable en los asentamientos cercanos. Los residentes que estaban más cerca del límite eran más dependientes de la leña y la extracción de recursos naturales. Si bien ambas zonas eran dependientes de ingresos de fuera de su propia comunidad, los hogares

en los asentamientos cercanos lo eran aún más. Por el contrario, los hogares en los asentamientos lejanos habían participado durante más años y en más actividades en la zona de amortiguamiento. Los resultados son de utilidad para la administración del parque con respecto a las designaciones de zonificación.

RÉSUMÉ

La gestion de la zone tampon du Parc National Chitwan est considérée comme un programme couronné de succès au Népal. Cependant, les zones tampon sont généralement considérées comme des entités homogènes sans prendre en compte les dynamiques intra-zonale. Cette étude a examiné l'impact des rhinocéros ainsi que l'utilisation des ressources par les foyers au sein d'une zone tampon – les Comités de Développement Villageois de Kolhuwa. Des enquêtes auprès des ménages (N=68) ont été menées avec un échantillonnage basé sur le type de village et l'étendue du terrain. Un questionnaire structuré et semi-structuré a servi à interroger les chefs de famille et à recenser les points GPS. La zone tampon a été divisée en deux entités – les implantations locales et éloignées, en se basant sur la distance du périmètre du parc. Les résultats ont démontré que les impacts des rhinocéros sont plus prononcés chez les ménages près du périmètre et vont en diminuant avec leur éloignement. Les ménages ont du mal à produire suffisamment de nourriture pendant au moins six mois de l'année, et ceci est plus apparent dans les villages proches. Les habitants proches du périmètre dépendent dans une plus large mesure de l'exploitation du bois de chauffe et des ressources naturelles locales. Alors que les deux zones sont tributaires de revenus générés à l'extérieur de leur communauté, les ménages dans les villages proches en dépendent le plus. Inversement, les ménages dans les villages éloignés ont été impliqués dans davantage d'activités et depuis plus longtemps dans la zone tampon. Ces résultats s'avèrent utiles pour la désignation du zonage par les gestionnaires du parc.



INDIGENOUS PROTECTED AREAS AND ICCAS: COMMONALITIES, CONTRASTS AND CONFUSIONS

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ABSTRACT

Indigenous Protected Areas (IPAs) in Australia and ICCAs (an acronym derived from ‘Indigenous and Community Conserved Areas’, originally used to summarize ‘Indigenous peoples’ protected areas, Indigenous peoples’ conserved territories and community conserved areas’) internationally are both area-based designations that provide contemporary expressions of the ancient and ongoing relationships between Indigenous peoples (and also non-Indigenous local communities in the case of ICCAs) and their local environments – with a particular emphasis on conservation outcomes. This paper explores commonalities and contrasts between IPAs and ICCAs, seeking to clarify their meanings and applications, and also to contribute to debate on the concepts of ‘conserved areas’ and ‘protected areas’ within the IUCN conservation lexicon. The paper describes the evolution of the IPA concept from being based on Indigenous legal ownership (tenure) of land to being based on Indigenous ‘Country’ (traditional clan estates), irrespective of current legal ownership. This is contrasted with the evolution of the ICCA concept that currently only applies to Indigenous peoples’ and local communities’ territories and areas where major decision-making authority has been retained by the respective Indigenous peoples or local communities. Proposals are made to clarify the use of the terms ‘protected area’ and ‘conserved area’, particularly in the context of respecting the rights of Indigenous peoples and local communities to assign their own designations to their respective territories and areas.

Key words: Indigenous Protected Areas, ICCAs, Indigenous peoples’ and local communities’ territories and areas, IUCN protected area matrix

INTRODUCTION

Indigenous Protected Areas (IPAs) in Australia and ICCAs¹ internationally are both area-based designations that provide contemporary expressions of the ancient and ongoing relationships between Indigenous peoples (and also non-Indigenous local communities in the case of ICCAs) and their local environments – with a particular emphasis on conservation outcomes. Because of these shared characteristics, IPAs are sometimes characterized as Australian examples of ICCAs (Borrini-Feyerabend, 2010; Davies et al., 2013), whereas a closer analysis reveals that significant differences between the two concepts have emerged as both have evolved over the last 10 to 15 years. This paper explores commonalities and contrasts between IPAs and ICCAs. It seeks to clarify their meanings and applications, and also to contribute to debate on the concepts of ‘conserved areas’ and ‘protected areas’ within the IUCN conservation lexicon.

IPAs are areas of land and/or sea that have been voluntarily dedicated by their Indigenous traditional owners, recognized by all tiers of Australian governments as protected areas, and managed by a combination of ‘*legal and other effective means*’ (Szabo & Smyth, 2003), consistent with IUCN’s protected area definition and guidelines (Dudley, 2008). There are currently 72 IPAs across Australia, comprising over 40 per cent of the total area of recognized protected areas.

‘ICCA’ refers to areas of land and/or sea where Indigenous peoples or local communities closely connected with the areas have decision-making responsibility, and where conservation of natural and associated cultural values is achieved either intentionally, or incidentally as the result of cultural or livelihood activities (IUCN, 2014). Estimates of the number and extent of ICCAs globally depends on whether the term is



Milmininya Dhamarandji at Dhambaliya coastline, Dhimurru IPA © Lisa Roeger, Dhimurru

used by third parties to refer to the ‘myriad’ areas they believe meet the ICCA criteria, or whether the term is confined to areas for which the relevant Indigenous peoples or local communities have themselves chosen to use this designation and then possibly listed their area on the ICCA Registry. The ICCA Registry website², which currently contains information regarding 30 ICCAs worldwide, is an online platform on which Indigenous or local community organizations can voluntarily provide data, case studies, maps, photos and stories which result in useful statistics and analysis on their territories or areas they have chosen to designate as ICCAs.

HISTORY AND EVOLUTION OF IPAS

The IPA concept was co-developed by representatives of Indigenous people and the Australian Government in the mid-1990s, in response to a commitment by the Australian Government to establish a comprehensive and adequate protected area system representative of the full range of ecosystems in Australia in the context of the 1994 IUCN guidelines for establishing protected areas (Smyth & Sutherland, 1996). These initiatives coincided with growing interest from Indigenous people across Australia to re-engage in the management of their traditional estates, including large areas returned to them through land claim processes of the 1970s and ‘80s, as well as areas included in government national parks.

It was apparent that a comprehensive system of protected areas representative of all Australian bioregions could only be achieved with the inclusion of some Indigenous-owned lands, whose owners were

unlikely to voluntarily return their lands to government ownership and management. The 1994 IUCN guidelines (and the subsequent 2008 guidelines), however, recognized Indigenous ownership, use and management of land as consistent with protected area status and that protected areas could be dedicated and managed through a combination of ‘*legal and other effective means*’ (Dudley, 2008). Consultations with Indigenous groups across Australia determined that some Indigenous landholders were interested in voluntarily dedicating and managing their land as protected areas as part of the National Reserve System (NRS)³, in return for government funds and other assistance required for the planning and ongoing management of their land.

The first IPA was voluntarily dedicated⁴ by Adnyamathanha people in 1998 at Nantawarrina in South Australia, the first occasion in Australia that any form of protected area had been established with the consent of Indigenous landowners. To date, 72 IPAs have been dedicated and recognized across Australia with a combined area of over 60 million hectares, which equates to over 40 per cent of the NRS⁵.

The role of Indigenous people is to plan, dedicate and manage IPAs; the role of government is to provide support and recognition. Recognition of an IPA occurs when an appropriate management plan has been developed, usually accompanied by a funding agreement with the government to enable the responsible Indigenous organization to implement the plan.

In the dedication and management of IPAs, *'legal means'* may include: legal ownership of land (and the control of access that ownership enables); Indigenous customary rights enshrined in legislation; protection of sacred sites and other cultural sites and areas through cultural heritage legislation; and protection of culturally significant species and habitats through biodiversity conservation legislation. *'Other effective means'* for managing IPAs include: the development and implementation of management plans (which includes many practical activities not based on legal instruments, such as feral animal control, weed management, monitoring and research); Memoranda of Understanding and other partnerships with government agencies, community natural resource management groups, conservation NGOs and neighbouring landholders; and funding and other resources provided by governments, NGOs, other partners and through commercial activities on the IPA (e.g. visitor permit fees or eco-cultural tourism operations).

From tenure-based to Country-based IPAs

From 1998 to 2011, IPAs were only established on land that was legally owned by Indigenous people under various forms of exclusive tenure (freehold, leasehold, native title etc.). These tenure-based IPAs work well for Indigenous groups who have substantial legal ownership of their traditional clan estates, which are often referred to by Indigenous Australians as 'Country'. In this context 'Country' refers to: *'...more than just a geographical area: it a shorthand for all the values, places, resources, stories, and cultural obligations associated with that geographical area. For coastal Aboriginal peoples and Torres Strait Islanders, "Country" includes both land and sea areas, which are regarded as inseparable from each other'*. (Smyth, 1994)

Tenure-based IPAs, however, are not feasible for the many Indigenous groups who have legal ownership of only small portions or none of their traditional Country. Neither do they work for Indigenous groups whose Country has already been dedicated by governments as national parks or other forms of protected area. Furthermore, in coastal areas, tenure-based IPAs generally do not accommodate the inclusion of Indigenous peoples' traditional marine estates ('Sea Country'), because Indigenous ownership of marine areas has so far only received limited recognition in Australia (Smyth, 2008). While the Australian High Court has confirmed that land rights legislation in the Northern Territory recognizes Indigenous ownership of intertidal land and intertidal seawater in that jurisdiction, exclusive Indigenous ownership of marine areas beyond low tide in the Northern Territory, and all

Sea Country elsewhere in Australia, remains unrecognized in Australian law (Butterly, 2013).

In 2011, the first IPA based on Country rather than tenure was established in far north Queensland. The Mandingalbay Yidinji IPA (Mandingalbay Yidinji, 2011) was dedicated over multiple tenures, including a national park, forest reserve, environmental reserve and marine park, all lying within the traditional estates of Mandingalbay Yidinji People. This was achieved following legal recognition of co-existing native title rights over some of the tenures, with recognition and support from the government agencies for managing the existing protected areas within the overarching IPA.

Country-based (multi-tenure) IPAs are managed through a similar range of *'legal and other effective means'* by which Indigenous-owned (single tenure) IPAs are managed, with the addition of a governance committee that includes representatives of Indigenous traditional owners, relevant government agencies and other parties collaborating in achieving the goals of the IPA, as well as the shared legislative authorities and capacities of collaborating partners (Rose, 2013). All tiers of government recognize that the various tenures previously managed separately by different agencies now constitute a single Country-based IPA, complementing rather than replacing the component protected areas. An IPA management plan describes the natural and associated cultural values across all tenures within the IPA, and sets out strategies and actions for collaborating partners to achieve the management goals of the IPA – complementing (not replacing) the statutory management plans for the component protected areas.

Following the example of the Mandingalbay Yidinji IPA, several other Country-based IPAs have been dedicated elsewhere in Queensland (Girringun Regional IPA, Kuku Yalanji IPA and Thuwathu/Bujimulla IPA), the Northern Territory (Yanyuwa IPA) and Western Australia (Nyangumarta IPA); planning is currently underway for several other Country-based, multi-tenure IPAs in several Australian jurisdictions.

Sea Country IPAs

Dhimurru IPA, dedicated in 1990, on the north-east Arnhem Land coast in the Northern Territory included 9,000 hectares of Sea Country that had previously been registered as a complex of marine sacred sites under the *Northern Territory Aboriginal Sacred Sites Act 1989* (NT). The legal protection of the marine sacred sites was sufficient for the Australian Government to recognize the inclusion of Sea Country into the Dhimurru IPA (Smyth, 2007).



Miyapunu (Olive Ridley) Marine Turtle rescue, Dhimurru IPA © Vanessa Drysdale, Dhimurru

However, for the Yolngu people of north-east Arnhem Land, the traditional owners and managers of Dhimurru IPA, the area of registered marine sacred sites included in the IPA represented only a small fraction of their customary marine estates. Further planning and negotiation with government agencies, non-government organizations and other interest groups eventually led to the dedication and recognition of an additional 400,000 hectares of Sea Country into the Dhimurru IPA – without any expansion of the area of registered marine sacred sites and without legal recognition of customary ownership rights of the additional Sea Country included in the IPA.

The dedication and recognition of the expanded Dhimurru IPA (Dhimurru Aboriginal Corporation, 2015) was achieved by demonstrating, through provisions in the management plan, collaborative governance arrangements and the shared capacities of Dhimurru Aboriginal Corporation (representing Yolngu traditional owners), partner government agencies, commercial and recreational fishery organizations, research institutions and others that the conservation and sustainable use goals of the IPA could be achieved consistent with a Category V protected area. The expanded Dhimurru IPA

provides a contemporary expression of Yolngu people's ancient and continuing cultural connection to, and responsibility for, their Sea Country estates. It provides a new pathway for Indigenous-led, collaboratively governed and managed integrated coastal land and sea protected areas – in an Australian jurisdiction where there has long been political and community resistance to establishing legislated marine protected areas.

IPAs in the IUCN protected area matrix

All IPAs, whether based on tenure, Country and with or without Sea Country (marine areas), are consistent with the IUCN protected area governance sub-type '*Indigenous peoples' protected areas and territories – established and run by Indigenous peoples*'. Dudley (2008) defines Indigenous peoples' protected areas as: '*clearly defined geographical spaces, within the lands and waters under traditional occupation and use by a given indigenous people, nation or community, that are voluntarily dedicated and managed, through legal or other effective means including their customary law and institutions, to achieve the long-term conservation of nature with associated ecosystem services, as well as the protection of the inhabiting communities and their culture, livelihoods and cultural creations*'.

Since Country-based IPAs (including Sea Country IPAs) involve collaboration with government agencies and other partners, these IPAs share some of the features of IUCN governance type B 'Shared Governance'. However, as the planning, dedication, collaboration and management is led by the Indigenous traditional owners, the above IUCN definition of Indigenous peoples' protected areas most accurately reflects all IPAs.

Country-based planning

The evolution of IPAs from solely being based on legal tenure to embrace the option of being based on traditional Country (including Sea Country) was facilitated through a process of Country-based planning (Smyth, 2011). A Country-based plan is simply a plan for the Country of a particular Indigenous group, as defined and selected by that group. If the plan is developed by a single family or clan group, the Country-based plan may relate to a relatively small area. Alternatively, an Indigenous group may comprise members of several clans, or a whole language group or perhaps several language groups – in which case the Country-based plan would relate to a larger area. The critical factor to a successful Country-based plan is that the Indigenous group determines the cultural and geographical scale at which they wish to plan.

Because Country-based plans are based on traditional geographical and cultural scales they can include multiple tenures, multiple interest groups, multiple rights holders (e.g. farmers and commercial fishers) and multiple authority holders (such as government agencies). As an Indigenous-led process, Country-based plans provide an opportunity for Indigenous people to document their cultural, natural and livelihood values across all of their traditional Country, irrespective of current tenure and legal authority, and to build understanding and collaboration among other interest groups and authority holders for the safeguarding of those values.

Country-based plans also provide Indigenous people with the opportunity to consider what management or conservation framework (if any) they wish to apply to their traditional Country, including over portions of their Country for which they may no longer have legal authority. The Mandingalbay Yidinji IPA, for example, came about as the result of undertaking a strategic plan for Mandingalbay Yidinji Country (Mandingalbay Yidinji Aboriginal Corporation, 2009) which documented a wide spectrum of values and considered opportunities for protecting and managing those values through building partnerships across tenures, landholders and agencies. Negotiating support for the implementation of a Country

-based plan is a challenging process, but the experience so far in Australia has been that well facilitated, Indigenous-led planning can lead to unexpected levels of collaboration among multiple parties – including between government agencies that had hitherto not collaborated with each other⁶.

HISTORY AND EVOLUTION OF ICCAS

The term 'ICCA' evolved from 'CCA' (Community Conserved Areas), a concept that emerged in the lead up to, and during, the 2003 World Parks Congress. CCAs were defined as: '*Natural and modified ecosystems, including significant biodiversity, ecological services and cultural values, voluntarily conserved by indigenous peoples and local and mobile communities through customary laws or other effective means*' (Borrini-Feyerabend et al., 2004)⁷.

CCAs were regarded as pre-existing areas, established in the distant past, over which Indigenous people or local communities had both a cultural connection and decision-making authority, and from which conservation outcomes were achieved – even though those outcomes may be the result of cultural or livelihood practices rather than an intent to achieve conservation of natural and associated cultural values.

Borrini-Feyerabend et al. (2004) suggested that some CCAs may meet protected area criteria and proposed that CCAs should be recognized as one of four governance types for protected areas. However, when the IUCN's *Guidelines for Applying Protected Area Management Categories* were developed (Dudley, 2008), CCAs were allocated to a sub-type of governance type D '*Governance by Indigenous peoples and local communities*'⁸, within which the following two sub-types are recognized:

- Indigenous peoples' protected areas and territories – established and run by Indigenous peoples; and
- Community conserved areas – declared and run by local communities.

Whereas CCAs originally referred collectively to areas managed by Indigenous peoples and by local communities, Dudley (2008) uses the term '*Community conserved areas*' as a governance sub-type referring only to areas managed as protected areas by local communities. Elsewhere in Dudley (2008), the term '*Indigenous and community conserved areas (ICCAs)*' is used to summarize '*Indigenous peoples' protected areas, Indigenous peoples' conserved territories and community conserved areas*', but neither 'ICCAs' nor 'Indigenous and community conserved areas' appear as part of the IUCN protected area matrix.



Djwalu Mununggurr hunting, Dhimurru IPA © Vanessa Drysdale, Dhimurru

From 2008 onwards, 'ICCAs' has been variously translated as:

- Indigenous peoples' protected areas, Indigenous peoples' conserved territories and community conserved areas (Dudley, 2008);
- Indigenous/Community Conserved Areas (Kothari, 2008);
- Indigenous and community conserved areas (Kothari, 2008);
- Indigenous territories and community conserved areas (Kothari, 2008);
- Indigenous conservation territories and areas conserved by indigenous peoples and local communities (ICCA Consortium, 2010);
- Indigenous Peoples' and Local Communities' Conserved Territories and Areas (Kothari et al., 2012);
- Indigenous Peoples' and Community Conserved Territories and Areas (Borrini-Feyerabend et al., 2013);
- Territories and areas conserved by indigenous peoples and local communities (IUCN, 2014; Borrini-Feyerabend & Hill, 2015);
- Indigenous peoples' and local community conserved territories and areas (ICCA Consortium, 2015);
- Indigenous and Community Conserved Areas (UNEP-WCMC, 2015).

Most recently, IUCN (2014) and Borrini-Feyerabend and Hill (2015) have described 'ICCAs', as an 'abbreviation' for the territories and areas conserved by Indigenous peoples and local communities, referencing both Dudley (2008) and Kothari et al. (2012). However, as noted above, Dudley (2008) includes '*Indigenous peoples' protected areas*' within the arrangements that are summarized as '*Indigenous and Community Conserved Areas*', while Kothari et al. (2012) refer to the '*phenomenon of Indigenous Peoples' and Local Communities' Conserved Territories and Areas (ICCAs)*', without inclusion of '*Indigenous peoples' protected areas*'. Reference to '*Indigenous peoples' protected areas*' has also been omitted from subsequent published explanations of the term 'ICCAs' and from recently published versions of the IUCN protected area matrix (discussed further below).

Notwithstanding the somewhat convoluted history and diverse translations of 'ICCAs', the essential meaning of the term has maintained the key characteristics of the original CCAs. The three key characteristics of ICCAs are:

- An Indigenous people or local community possesses a close and profound relation with a territory, area or habitat;
- The people or community is the major player in decision-making related to the site and has *de facto* and/or *de jure* capacity to develop and enforce regulations; and
- The people's or community's decisions and efforts lead to the conservation of biodiversity, ecological functions and associated cultural values, regardless of original or primary motivations (IUCN, 2014).

Achievements and challenges of the ICCA concept

Over the 12 years since the 2003 World Parks Congress, awareness and application of the ICCA concept has grown across the globe, bringing much needed support to many Indigenous peoples and local communities in their struggles to maintain the natural and cultural values and ecosystem functions of the areas of long standing cultural, spiritual and economic importance to them. Through the work of the ICCA Consortium and others, the concept of ICCAs has provided a framework for communicating the importance of these areas and for their recognition and support. International policies and recommendations, such as through the Convention on



Dhimurru Landscape © Dhimurru

Biological Diversity, World Conservation Congresses and World Parks Congresses have, directly and indirectly, embraced the significance of Indigenous peoples' and local community conserved territories and areas, without necessarily using the term 'ICCAs'.

There are, however, challenges and constraints within the current ICCA concept that could potentially limit further progress in gaining the recognition and support referred to above. These challenges stem from the conflation of Indigenous and local community interests into a single conceptual framework, and the application of the 'conserved' label to Indigenous territories and local community areas at a global or regional scale. Another potential constraint arises from the current application of the ICCA concept only to portions of Indigenous peoples' traditional territories or local communities' areas where the respective peoples or communities have retained major decision-making authority. A further complexity arises from inconsistent terminology within the IUCN protected area governance/management matrix. There is also the inherent difficulty of applying to one location an acronym that refers to multiple territories and areas. These challenges are explored further below.

Conflation of Indigenous peoples' and local communities' interests

While 'ICCA' is a convenient collective term to describe the many locations around the globe where the intentional or unintentional activities of Indigenous

peoples and local communities result in conservation outcomes, difficulties arise when applying the term to a particular place. While there may be geographical overlaps of interest, each traditional territory or area will typically be associated with either an Indigenous group or a local community, which therefore can make it inappropriate to use a collective term that embraces both Indigenous peoples and local communities.

In Nepal, for example, some Indigenous people have expressed concern about the reference to local communities, and some local communities have expressed concern about the reference to Indigenous people, when engaging in dialogues about the ICCA concept with representatives of the local ICCA network in that country⁹. Similar concerns have been raised informally with the author at several international gatherings; it would be valuable to elucidate the extent to which this matter is more widely of concern to Indigenous peoples and/or local communities.

Although some international frameworks do link Indigenous peoples and local communities, there is strong global recognition of the distinct identity and rights of Indigenous peoples, as expressed, for example, in the UN Declaration on the Rights of Indigenous Peoples. A collective term that has a level of convenience for use in discussions about Indigenous peoples' territories and local communities' areas has the potential to place a barrier to engagement among the peoples and communities whom the concept seeks to support.



Dhimurru staff © Dhimurru

A possible solution to these difficulties is to use more specific terms, such as the IUCN protected area governance sub-types ‘*Indigenous peoples’ protected areas*’ and ‘*Community conserved areas*’, which do distinguish the separate identities of Indigenous peoples and local communities, and which can be used to refer to a particular location. These terms, however, only apply to locations that are dedicated and recognized as protected areas. As discussed further below, a wider solution to these terminological challenges is therefore required to accommodate locations that do not meet the IUCN protected area definitions.

Assigning labels to territories and areas without informed consent

The early literature on CCAs and ICCAs applied these terms to myriad locations around the globe without consideration of the need to obtain the prior informed consent of the people and communities connected to the territories and areas to which the terms referred. These acronyms overtly express the ‘conserved’ label on locations which may be regarded very differently by the Indigenous peoples and communities involved. Since 2010, the ICCA literature has included caveats such as: *The application of the generic term ‘ICCA’ to the myriad of territories and land and/or water areas conserved by Indigenous peoples and local communities has not yet been submitted to most of them for their Free, Prior and Informed Consent. Such consent should not be implied. The term is used here for the purpose of dialogue and communication rather than labelling.* (ICCA Consortium, 2010)

Even with this caveat, however, the ongoing reference to myriad ICCAs still implies that countless unspecified locations are deemed to be ICCAs, without the knowledge or engagement of the respective people or communities. Certainly in Australia there is a strong cultural proscription against ‘*speaking for someone else’s Country*’ (Smyth & Grant, 2012); to do so shows a lack of

respect for the people and their Country, even if no disrespect is intended.

Constraints of the ICCA criteria

The current criteria for recognition of ICCAs constrain Indigenous peoples or local communities from applying the ICCA framework to areas of their traditional domains if they no longer have *de facto* or *de jure* decision-making power over those areas (IUCN, 2014). This limitation of the current ICCA criteria is similar to the limitation of IPAs when they were restricted to areas of Indigenous-owned land over which Indigenous people had complete decision-making authority. As discussed above, the IPA concept has evolved beyond the constraints of Indigenous tenure to better reflect traditional Country, providing an opportunity for this ancient cultural and geographical scale to re-emerge as the basis for contemporary landscape and seascape management. There may be opportunities for the ICCA concept to similarly evolve, as discussed further below.

ICCAs and protected areas

The intersection of ‘ICCAs’ with protected areas presents a challenge for the understanding, communication and adoption of the ICCA concept. As noted above, ‘ICCA’ can be applied to areas where conservation outcomes occur (or are assumed to occur) without explicit conservation intent by the relevant Indigenous peoples or local communities. It is also applied to areas explicitly dedicated by those peoples and communities as protected areas. The distinction between ‘conserved areas’ and ‘protected areas’ is further complicated by the terminology used in the IUCN protected area matrix (Dudley, 2008), which refers to ‘*Indigenous peoples’ protected areas*’ and ‘*Community conserved areas*’.

Adding to the confusion have been unexplained changes of terminology in recently published versions of the IUCN protected area matrix, while referencing the original source (Dudley, 2008). For example, the

governance sub-type '*Indigenous peoples' protected areas and territories*' has been changed to '*Indigenous peoples' conserved areas and territories*' in IUCN/CEESP (2010), ICCA Consortium (2010), Borrini-Feyerabend et al. (2013) and IUCN (2014), and changed to '*Indigenous bio-cultural areas and territories*' in ICCA Consortium (2010), while referencing Dudley (2008) and without acknowledging that these changes have been made. With respect to governance type C (Private protected areas), IUCN/CEESP (2010), Borrini-Feyerabend et al. (2013) and IUCN (2014) refer to '*Conserved areas established and run by individual landowners*', whereas Dudley (2008) makes no reference to '*Conserved areas*' within this governance type.

The most recent representation of the IUCN protected area matrix (Borrini-Feyerabend & Hill, 2015) does acknowledge that changes have been made to '*The updated IUCN Protected Area Matrix (as modified by the authors)*', without detailing the changes that have been made or why these changes were needed. The source for the 'updated' version of the matrix is identified as Borrini-Feyerabend et al. (2013) in which there is no mention that changes have been made to the Dudley (2008) version. While the aim of these changes may be to standardize terminology, it remains unclear why '*conserved area*' is preferred to '*protected area*' in a protected area matrix; and the effect of the change is to significantly re-characterize the governance sub-type to which IPAs in Australia had hitherto been assigned.

DISCUSSION

The concepts of IPAs and ICCAs have both led to increased recognition and support for the ongoing efforts of people and communities to care for territories and areas with which they have long and deep associations. To maintain this effort it would be helpful to clarify the language used to describe and build support for these initiatives and, where possible, to re-invigorate the traditional cultural and geographical scales which have long characterized the human use and management of terrestrial and coastal marine environments.

Clarification of language could include restricting the use of the term '*conserved areas*' to locations where the relevant Indigenous people or local communities have chosen to apply this designation to their respective territories or areas in order to achieve recognition and support for the conservation outcomes from those locations. The terms '*Indigenous peoples' protected areas*' and '*Community protected areas*' could then be used as governance sub-types within a revised IUCN protected area matrix, for locations where recognized

protected area dedications have been made by the relevant peoples and communities.

The acronym 'ICCA' has been useful in drawing attention to the contribution made by the territories and areas of Indigenous peoples and local communities to global conservation, but its continued use may require a more nuanced approach to avoid being counterproductive. The conflation of Indigenous peoples' interests with those of local communities risks alienating both groups, and the collective meaning of the term, however it is defined, makes it problematical to apply to a particular location.

Applying any generic term or acronym to those parts of Indigenous territories and local community areas deemed to have conservation value, has the potential to imply that these territories and areas are not valued unless they are shown to have conservation outcomes. A more constructive approach is to encourage the re-emergence and continuation of Indigenous peoples' and local communities' governance of the totality of their traditional territories and areas, and support them to decide the outcomes and labels they wish to ascribe to those territories and areas.

Through a Country-based planning approach, the experience of IPAs in Australia has shown that by means of the negotiated exercise of cultural authority over all of their traditional Country despite current legal constraints, Indigenous people can lead innovative arrangements for the conservation of natural and associated cultural values across multiple tenures; this is being achieved across diverse land and sea environments in collaboration with multiple partners. This of course is a challenging process: it requires relentless Indigenous leadership of the collaborative partnerships, as well as the cooperation of government agencies and others who require ongoing assurance that the investments in collaboration, and the IPA designation itself, are achieving mutually rewarding outcomes. Nevertheless, the IPA framework does now provide for this option – an approach which has the potential to be applied elsewhere, possibly through a process similar to Country-based planning and the further evolution of the ICCA concept.

The emerging discussion on 'other effective area-based conservation measures' (Jonas et al., 2014), and the establishment of the dedicated World Commission on Protected Area Task force¹⁰ to pursue that discussion, may provide further clarification on the appropriate and respectful use of terminology for territories and areas where conservation outcomes are achieved, and provide a process for the evolution of the ICCA concept to occur.

This process may also facilitate the revision of the terms used in the IUCN protected area matrix in a transparent manner.

PROPOSALS

The following proposals to refine and apply the use of terms discussed in this paper are presented to stimulate dialogue and to clarify the concepts and language used to promote support for the contributions Indigenous peoples and local communities make to caring for our planet:

- Support Indigenous peoples and local communities to develop strategic plans for their traditional territories and areas, irrespective of the current geographical extent of their decision-making authority, to explore options to care for and pursue livelihoods from those territories and areas – including, but not limited to, their voluntarily designation as ‘*conserved areas*’, ‘*protected areas*’ or some other governance framework of their choice. These Indigenous-led and community-led planning processes need not require legal authority or government approval, but would incorporate whatever legal and other effective mechanisms are locally available;
- Replace or complement the collective term ‘ICCA’ with more specific terms such as ‘Indigenous conserved area’, ‘Indigenous conserved territory’ and ‘community conserved area’ to be applied to areas and territories where the respective peoples and communities have chosen to assign these designations to their land and/or waters, without formal dedication as protected areas;
- Within governance type D in an amended IUCN protected area matrix:
 1. maintain ‘*Indigenous peoples’ protected areas and territories*’ as a governance sub-type to apply to areas and territories that have been dedicated by the relevant Indigenous peoples and appropriately recognized; and
 2. replace ‘*Community conserved area*’ with ‘*Community protected area*’ as a governance sub-type to apply to areas that have been dedicated by the relevant local community and appropriately recognized;
- When a collective term is required for discussion, use a neutral descriptor such as ‘Indigenous peoples’ and local communities’ territories and areas’ to refer to places where conservation outcomes may occur – unless and until the appropriate peoples or communities have chosen to apply ‘conserved’, ‘protected’ or some other label to these territories or areas; and

- If we are tempted to create and apply new acronyms and abbreviations, let us try to avoid them becoming ‘...*methods of mystification, of creating secrets that conceal meaning from the uninitiated*’ (Adams, 2015).

FOOTNOTES

¹ The acronym ‘ICCA’ is derived from ‘Indigenous and Community Conserved Areas’ and was originally used by Dudley (2008) to summarise ‘Indigenous peoples’ protected areas, Indigenous peoples’ conserved territories and community conserved areas’; ‘ICCA’ has subsequently been given a variety of alternative meanings as discussed further in this paper.

² <http://www.iccaregistry.org/>

³ The NRS is Australia’s network of terrestrial protected areas, comprising 146 million hectares covering 19 per cent of the Australian continent. The NRS includes Federal, State and Territory national parks and other conservation reserves, private protected areas, and protected areas owned and managed by conservation NGOs, protected ecosystems on farm land, and Indigenous Protected Areas.

⁴ The terms ‘declaration’ and ‘dedicated’ are both used to describe the formal process of establishing an IPA; ‘dedicated’ is used here for consistency with the IUCN protected area definition (Dudley, 2008).

⁵ Current data on IPAs provided by Marcus Sandford, Environment Branch, Department of the Prime Minister and Cabinet, Australian Government. See also: www.abc.net.au/news/2015-10-02/katiti-petermann-indigenous-protected-area/6818100

⁶ Other examples of Country-based plans are available at: www.environment.gov.au/indigenous/seacountry/ and www.clcac.com.au/publications/2014/84

⁷ A subsequent definition of CCAs replaced ‘ecological services’ with ‘ecological functions’ to reflect the wider role of ecosystems beyond services to people (Borrini-Feyerabend & Dudley, 2008).

⁸ The other three governance categories are: A. Governance by government; B. Shared governance; and C. Private governance.

⁹ Personal communication from Jailab Rai, ForestAction, Nepal, who points out that these questions are being raised in the context that: Indigenous peoples in Nepal are struggling to have their Indigenous identities recognized by the State; and the mixture of Indigenous and non-Indigenous people that comprise most ‘communities’ in Nepal, resulting in fear and scepticism by some non-Indigenous people.

¹⁰ Terms of reference and purpose of this Task Force are available at www.cmsdata.iucn.org

ABOUT THE AUTHOR

Dermot Smyth studied biology at the Australian National University and James Cook University in the 1970s; his collaboration with Indigenous peoples began while undertaking wildlife research in Papua New Guinea, Indonesia and West Africa. On returning to Australia, Dermot embarked on what turned out to be a 35 year career working on research and consultancy projects to support the engagement of Aboriginal and Torres Strait Islander people in the management of their traditional land and sea estates (“Country”) in all Australian states and territories. Dermot is currently an adjunct fellow at Charles Darwin University where he supervises post-graduate students and participates in research, planning and policy initiatives with Indigenous partners. Dermot’s publications are available on his website www.sbconsultants.com.au

REFERENCES

- Adams, P. (2015). Can I just ask, WTF? *The Weekend Australian Magazine* July 25-26, 2015 (www.theaustralian.com.au/life/weekend-australian-magazine).
- Borrini-Feyerabend, G. (2010). *Bio-cultural diversity conserved by indigenous peoples and local communities – examples and analysis*. Companion to IUCN/CEESP Briefing Note No.10. Prepared for ICCA Consortium, GEF SGP, GTZ, IIED and IUCN/CEESP.
- Borrini-Feyerabend, G. and Dudley, N. (2008). Community Conserved Areas. In: N. Dudley and S. Stolton (eds) *Defining Protected Areas - An international conference in Almeria, Spain, May 2007*. Gland, Switzerland: IUCN.
- Borrini-Feyerabend, G. and Hill, R. (2015). Governance for the conservation of nature. In G. L. Worboys, M. Lockwood, A. Kothari, S. Feary and I. Pulsford (eds.) *Protected Area Governance and Management*, pp. 169–206, Canberra: ANU Press.
- Borrini-Feyerabend, G., Kothari, A and Oviedo, G. (2004). *Indigenous and Local Communities and Protected Areas: Towards Equity and Enhanced Conservation*. World Commission on Protected Areas Best Practice Protected Area Guidelines Series No. 11. Gland, Switzerland: IUCN.
- Borrini-Feyerabend, G., Dudley, N., Jeger, T., Lassen, B., Pathak Broome, N., Phillips, A. and Sandwith, T. (2013). *Governance of Protected Areas – from understanding to action*. Best Practice Protected Area Guidelines Series No. 20. Gland, Switzerland: IUCN.
- Butterly, L. (2013). Changing Tack: Akiba and the Way Forward for Indigenous Governance of Sea Country. *Australian Indigenous Law Review* 17(1): 2.
- Davies, J., Hill, R., Walsh, F., Sandford, M., Smyth, D. and Holmes, M. (2013). Innovation in Management Plans for Community Conserved Areas: Experiences from Australian Indigenous Protected Areas. *Ecology and Society* 18(2): 14. <http://dx.doi.org/10.5751/ES-05404-180214>.
- Dhimurru Aboriginal Corporation (2015). *Dhimurru Indigenous Protected Area Management Plan 2015-2022*. Dhimurru Aboriginal Corporation, Nhulunbuy, Australia (available at www.dhimurru.com.au).
- Dudley, N. (ed.) (2008). *Guidelines for Applying Protected Area Management Categories*. Gland, Switzerland: IUCN.
- ICCA Consortium (2010). *Bio-cultural diversity conserved by indigenous peoples and local communities – examples and analysis*. Companion document to IUCN/CEESP Briefing Note No. 10, 2010.
- ICCA Consortium (2015). ICCA Consortium website www.iccaconsortium.org, accessed 26 July 2015.
- IUCN (2014). *A primer on governance for protected areas and conserved areas*. Gland, Switzerland: IUCN.
- IUCN/CEESP (2010). *Strengthening what works – recognising and supporting the conservation achievements of indigenous peoples and local communities*. IUCN/CEESP Briefing Note no. 10, May 2010.
- Jonas, H. D., Barbuto, V., Jonas, H. C., Kothari, A. and Nelson, F. (2014). New Steps to Change: Looking Beyond Protected Areas to Consider Other Effective Areas-Based Conservation Measures. *PARKS* 20.(2): 111-127. DOI: 10.2305/IUCN.CH.2014.PARKS-20-2.HDJ.en
- Kothari, A. (2008). Protected areas and people: the future of the past. *PARKS* 17 (2).
- Kothari, A., Corrigan, C., Jonas, H., Neumann, A. and Shrumm, H. (eds.) (2012). *Recognising and Supporting Territories and Areas Conserved by Indigenous Peoples and Local Communities: Global overview and national case studies*. Technical Series No. 64, Montreal, Canada: Secretariat of the Convention on Biological Diversity, ICCA Consortium, Kalpavriksh and Natural Justice.
- Mandingalbay Yidinji Aboriginal Corporation (2009). *Strategic Plan for Mandingalbay Yidinji Country*. Queensland, Australia: Mandingalbay Yidinji Aboriginal Corporation.
- Mandingalbay Yidinji Aboriginal Corporation (2011). *Mandingalbay Yidinji Indigenous Protected Area Management Plan*, www.djunbunji.com.au/indigenous-protected-area, accessed 26 July 2015.
- Rose, B. (2013). Indigenous Protected Areas – innovation beyond boundaries. In: P. Figgis, J. Fitzsimons and J. Irving (eds.) *Innovation for 21st Century Conservation*, pp. 50-55. Canberra: Department of Environment, Water, Sustainability, Population and Communities, Australian Government.
- Smyth, D. (1994). *Understanding Country – The Importance of Land and Sea in Aboriginal and Torres Strait Islander Societies*. Council for Aboriginal Reconciliation Key Issue Paper No. 1, Council for Aboriginal Reconciliation. Canberra, Australia: Australian Government Publishing Service.
- Smyth, D. (2007). Dhimurru Indigenous Protected Area: Sole management with partners. In: T. Bauman and D. Smyth, *Indigenous Partnerships in Protected Area Management in Australia: Three case studies*, pp. 100-126. Canberra: Australian Institute of Aboriginal and Torres Strait Islander Studies.
- Smyth, D. (2008). Just Add Water? Taking Indigenous Protected Areas into Sea Country. In: D. Smyth and G. Ward (eds.), *Indigenous Governance and Management of Protected Areas in Australia*, pp. 95-110. E-book published by the Australian Institute of Aboriginal and Torres Strait Islander Studies. Available at http://aiatsis.gov.au/sites/default/files/products/report_research_outputs/2008-protecting-country-ch8-smyth.pdf.
- Smyth, D. (2011). *Guidelines for Country-Based Planning*. Department of Environment and Resource Management, Queensland Government, Brisbane. Available at <http://>

www.ehp.qld.gov.au/cape-york/pdf/country-based-planning-guideline.pdf.

- Smyth, D. and Grant, C. (2012). Recognition and Support of ICCAs in Australia – case study for: recognising and supporting territories and areas conserved by Indigenous peoples and local communities. In: K. Ashish (ed.) with C. Corrigan, H. Jonas, A. Neumann and H. Shrumm, *CBD Global Overview and National Case Studies*, Secretariat Technical Series No. 64, ICCA Consortium, IUCN/TILCEPA, Kalpavriksh and Natural Justice.
- Smyth, D. and Sutherland, J. (1996). *Indigenous Protected Areas: conservation partnerships with Indigenous*

landholders. Consultancy Report for Environment Australia, Canberra, Australia.

- Szabo, S. and Smyth, D. (2003). Indigenous Protected Areas in Australia. In: H. Jaireth and D. Smyth (Eds.), *Innovative Governance: Indigenous Peoples, Local Communities and Protected Areas*, pp. 145-164. IUCN-sponsored publication, New Delhi: Ane Books.
- UNEP-WCMC (2015). ICCA Registry. Available at <http://www.iccaregistry.org>, accessed 26 July 2015.

RESUMEN

Las Áreas Protegidas Indígenas (API) en Australia y las áreas conservadas por pueblos indígenas y comunidades locales (ICCA, por sus siglas en inglés), que originalmente se empleaban en el ámbito internacional para resumir “áreas protegidas por pueblos indígenas, territorios conservados por pueblos indígenas y áreas conservadas por comunidades locales”, son designaciones basadas en zonas que proveen expresiones contemporáneas de las relaciones antiguas y actuales entre los pueblos indígenas (y también entre las comunidades locales no indígenas en el caso de las ICCA) y sus entornos locales –con un énfasis particular en los resultados de las acciones de conservación. Este trabajo explora aspectos comunes y contrastes entre las API y las ICCA, tratando de aclarar sus significados y aplicaciones, y contribuir al debate sobre los conceptos de “áreas conservadas” y “áreas protegidas” en el léxico de la UICN en materia de conservación. El artículo describe la evolución del concepto de API desde estar basado en la propiedad indígena legalmente reconocida (tenencia) de tierras hasta basarse en las tierras de clanes tradicionales, independientemente de la titularidad legal actual. Esto contrasta con la evolución del concepto de ICCA que actualmente se aplica solo a los territorios y áreas de pueblos indígenas y comunidades locales donde el poder de decisión ha sido conservado por los pueblos indígenas o las comunidades locales. Se formulan propuestas para aclarar el uso de los términos “área protegida” y “área conservada”, particularmente en el contexto del respeto a los derechos de los pueblos indígenas y las comunidades locales para conferir sus propias designaciones a sus respectivos territorios y áreas.

RÉSUMÉ

Les aires protégées autochtones (APAs) en Australie et les APACs (un acronyme pour «aires de patrimoine autochtone et communautaire», connus à l'origine en tant qu'aires protégées des populations autochtones ou territoires conservés par les peuples indigènes ou encore aires conservées par les communautés), sont chacune des appellations territoriales contemporaines qui traduisent les relations anciennes et actuelles entre les peuples autochtones et les communautés locales (ainsi que des communautés non-autochtones dans le cas des APAC) avec leur environnement – visant en particulier les résultats de conservation. Ce document explore les points communs et les différences entre les APAs et les APAC, cherchant à en préciser le sens et les applications, et aussi à contribuer au débat sur les concepts des «aires conservées» et des «aires protégées» dans le lexique de la conservation de l'UICN. Le document décrit l'évolution du concept de l'APA, initialement fondé sur la propriété juridique autochtone (foncière) de terres, et qui s'est par la suite fondé sur la notion de ‘pays’ autochtone (domaine clanique traditionnel), indépendamment de la propriété juridique. Ceci est en contraste avec l'évolution du concept de l'APAC qui ne s'applique actuellement qu'aux territoires des populations autochtones et des communautés locales où le pouvoir principal de prise de décisions est retenu par les peuples autochtones ou des communautés locales elles-mêmes. Des propositions sont faites pour clarifier l'utilisation des termes d'«aire protégée» et d'«aire conservée», en particulier dans le contexte du respect des droits des peuples autochtones et des communautés locales d'attribuer leurs propres désignations à leurs aires et territoires respectifs.



ASSESSING THE SOCIO-ECONOMIC STRESSORS OF GHANA'S ONLY STRICT NATURE RESERVE: KOGYAE

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ABSTRACT

The paper assessed the integrity of Kogyae, Ghana's only Strict Nature Reserve, as a Category Ia protected area, against the backdrop of pressures and threats posed by anthropogenic drivers. Primary data were derived from a combination of approaches namely, Rapid Assessment and Prioritization of Protected Areas Management Methodology, participatory appraisal approach and institutional data gathering. The results identified adjacent land use, poverty in nearby communities, and high population density as the underlying threats facing the reserve. These had fuelled proximate threats including bush fires, logging and poaching. The study revealed also that the recent re-zoning of the reserve by extending its boundaries to enhance its ecological viability has not only strained the relationship between local people and Officials of the Wildlife Division, but become the root cause of most of the underlying threats. Considering the pressure and threats of Kogyae, the study proposes two options for resolving the situation: granting the communities' request to engage in ecologically friendly activities in the 'Special Use Zone' by re-categorizing the zone appropriately according to IUCN definition, or resettlement of the communities elsewhere to free the reserve from human activities.

Key words: Category Ia, protected area, Ghana, communities, threats, pressures, Kogyae Strict Nature Reserve

INTRODUCTION

Protected areas are generally believed to be the cornerstones of biodiversity conservation (Bruner et al., 2001; Mulongoy & Chape, 2004; Chapes et al., 2008). By 2014, there were approximately 209,000 protected areas worldwide covering about 15.4 per cent of the terrestrial and inland water areas and 8.4 per cent of the marine area within national jurisdiction (0-200 nautical miles) (Juffe-Bignoli, 2014). Using the global standard for defining, recording and classifying protected areas, the IUCN recognizes six protected area categories, classified according to their management objectives (Dudley, 2008).

A Strict Nature Reserve is a protected area set aside to protect biodiversity and also possibly geological/geomorphological features, where human visitation, use and impacts are strictly controlled and limited to ensure protection of the conservation values. Such protected areas can serve as indispensable reference areas for

scientific research and monitoring (Dudley, 2008). This protected area (Category Ia) category represent the most restricted form of management among the six categories of protected areas, with very minimal human presence.

The Kogyae Strict Nature Reserve in Ghana was established with three main objectives (Wildlife Department, 1994):

- to retain the transitional vegetation and faunal types for scientific research and monitoring;
- to protect the watersheds of the tributaries of Sene and Afram Rivers; and
- to preserve the historical grounds of the Kwaman, Agogo and Kumawu people; where their last victorious battles against the Chumbulus from Northern Ghana were fought.

In spite of the unique importance of the Kogyae Strict Nature Reserve in Ghana's protected area system (Table 1), it is confronted with serious challenges, including

Table 1: Wildlife Protected Areas in Ghana. Source: EPA (1996)

Protected Area	Size km ²
National Parks (NP)	
Bia	78
Bui	1,820.6
Digya	3,478
Mole National Park	4,840.4
Kakum	207
Kyabobo	360
Nini-Suhien	160
Resource Reserves (RR)	
Anksa	343
Assin Attandanso	139.9
Bia (different from Bia NP)	228
Gbele	565.4
Kalakpa	320.2
Shai Hills	48.6
Strict Nature Reserve (SNR)	
Kogyae	385.7
Wildlife Sanctuary (WS)	
Boabeng-Fiema*	4.4
Bomfobiri	53.1
Owabi (also Ramsar site)	13.1
Agumatsa Wildlife Sanctuary*	3
Tafi Atome*	Not available

* PAs without Gazette notification

adjacent landuse, bush burning, poaching and invasive species, particularly *Chromolaena odorata* (Ayivor, 2012). Though information on the reserve remains scanty, these challenges are compounded by the activities of legally established communities in an area within the reserve designated as a 'special use zone' (SUZ) (Oduro-Ofori et al., 2015). The authenticity of the designation of Kogyae as a Category Ia protected area has, therefore, come under public scrutiny as human visitation, use and impacts cannot be said to be strictly controlled or limited. In effect, pressure and threats facing the reserve have tended to undermine its conservation values and ecological integrity, leaving many to question why its definition under the IUCN management categorization should not be reviewed. This paper examined the proximate and underlying causes of threats and pressures that the reserve faces and how these are impacting on its integrity as a Category Ia protected area.

The contemporary paradigm on natural resource management has evolved away from a top-down, regulatory style to a more participatory approach that

features close and diverse partnerships and collaborations between management agencies and end-user stakeholders (Dovers et al., 2015).

According to De Vente et al. (in press), processes that are likely to achieve successful outcomes in participatory resource management include the legitimate representation of stakeholders, professional facilitation and the provision of information and decision-making power to all participants. Dyer et al., (2014) gave a summary of outcome-based components of successful participatory process to include environmental ownership, equity, trust, learning and information exchange, better accepted decisions, better quality decisions, fairness, consensus, aims and outcomes achieved and influence and impact on outcome. Michener (1998) in an earlier study differentiated between 'planner-centred' and 'people-centred' participatory conservation. The planner-centred participation is when outsiders like NGOs, facilitate local people's acceptance of new innovations promoted by them. In this case, indigenous knowledge and local labour are often exploited. In the people-centred perspective, local people are empowered by enhancing local management capacity, increasing confidence in indigenous potential and raising collective consciousness, as well as developing different typologies of participation. Thus, whereas people-centred participation leads to development that is truly empowering, planner-centred participation tends to be nominal with local people acting as the passive recipients of development. Critics of the participatory approach argued that it will not succeed if strong alliances are not built on mutual respect and recognition of each group's particular interests (Chicchon, 2000); and if the local population is heavily dependent on local resources, as in the tropical rainforest of Africa (Terborgh & van Schaik, 2002). Mustalahti and Lund (2009) noted that success of the model may differ from country to country as security of rights and access to benefits by local communities may not be the same among countries. They suggested the need for advocacy groups to assist communities to assert their legal rights and to demand commitment of national governments to ensure equity and accountability.

The challenges of Kogyae Strict Nature Reserve in Ghana from the perspective of the local people relate to land expropriation without wider stakeholder involvement, local exclusion in decision making and government's unwillingness to grant local demands to avoid compromising on the principles of a strict nature reserve. Though several studies exist on Ghana's protected area system (e.g. Hagan, 1998; Attuquayefio & Fobil, 2005; Jachmann, 2007, 2008; Ayivor et al., 2013; Kyerematen

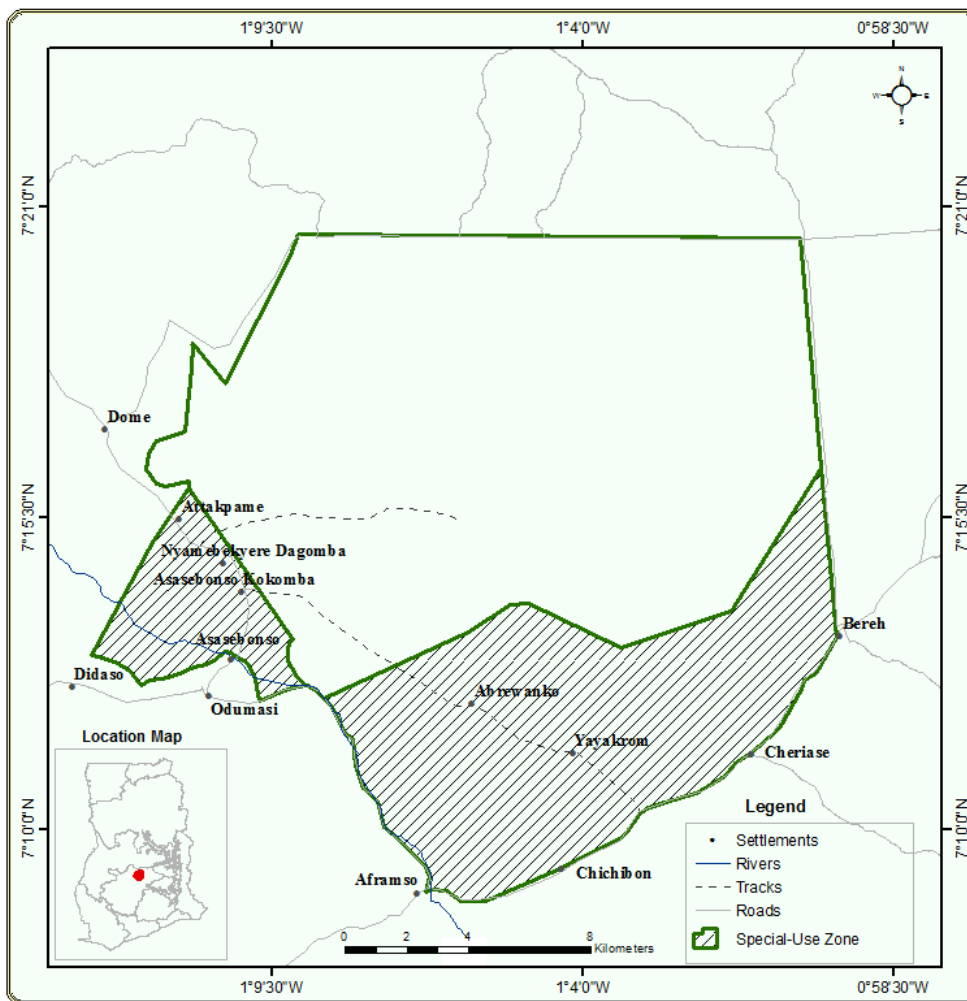


Figure 1. Map of the Kogyae Strict Nature

et al., 2014; Oduro-Ofori et al., 2015) there is paucity of information on the socio-economic stressors facing the Kogyae Strict Nature Reserve, the only one of its kind in Ghana, hence this study.

MATERIALS AND METHODS

Geographical Setting

The Kogyae Strict Nature Reserve lies in the transition zone between the Guinea Savannah and forest zones of Ghana, and covers an area of approximately 386 km². Kogyae is shared by the Kwamang and Kumawu traditional areas in Sekyere West and East districts of the Ashanti Region respectively. Before the establishment of Kogyae as a protected area, the core zone within the reserve served as a cultural heritage site for the two traditional areas, in recognition of its role as meeting grounds for militants from both areas to recruit, join forces and repel invading enemies. In 1952, the colonial Gold Coast government designated the site as the Kujani Bush Forest Reserve under the administration of the Forestry Department. In 1971, the reserve was designated as a Strict Nature Reserve under the Wildlife Reservation Regulations L.I. 710 of 1971 under the then Game and Wildlife Department (Ofori et al., 2014).

In order for the Strict Nature Reserve to maintain a viable ecological unit, the original forest reserve was extended southwards to include the sites of six communities (Figure 1) after some consultations with the traditional heads. The extension included also the Afram River, which flows along the southern portion of the reserve, to ensure constant water supply to wild animals (Wildlife Division, 2002). The six communities within the extended boundaries were Asasebonso, Atakpame, Nyamebekyere Dagomba, Yahayakura, Aberewanko and Asasebonso Konkomba. In addition to these six, four other communities, namely Aframso, Birem, Chichibon and Kyeiase are now located along the immediate fringes of the reserve as a result of the extension. These communities have continued to agitate and protest against the extended area from the time of its implementation (Wildlife Division, 2002).

Kogyae is located in the Afram Plains physiological region of Ghana, and is underlain by the Voltaian geological system. The site is generally low-lying with average heights of about 120m above mean sea level. A few areas within the reserve have higher elevation, attaining heights of between 215m and 230m. These



Participants at a focus group discussion © Jesse Ayivor

areas serve as the watershed for a network of streams dominated by tributaries of the Afram and Sene rivers, most of which dry up in the dry season (Hagan, 1998).

The climate of the area exhibits characteristics of the forest-savannah transition zone. The flora is reported to include about 105 vascular plant species comprising 57 trees, 10 shrubs, nine climbers, 17 herbs and 12 grasses. The main habitat types are transitional forest, riparian woodland, Guinea savannah and boval vegetation with open areas of short grassland found in areas with shallow soils and iron pans (Wildlife Department, 1994).

According to the records held by the Wildlife Division, the reserve used to support a small population of Elephants (*Loxodonta africana africana*), which migrated seasonally from Digya National Park but have stopped in recent times. Mammalian species of conservation importance reported to occur in the reserve include the Burron's kob (*Kobus kob*), Bushbuck (*Tragelaphus scriptus*), Waterbuck (*Kobus ellipsiprymnus*), Maxwell Duiker (*Cephalophus maxwelli*) and Grey Duiker (*Sylvicapra grimmia*). The reserve is reported to support also a number of primate species including Spot-nosed Monkey (*Cercopithecus petaurista*), Black and White Colobus (*Colobus polykomos*), the Olive Baboon (*Papio anubis*) and Patas Monkey (*Erythrocebus patas*), as well as uncommon species such as the Aardvark (*Orycteropus afer*) and Red River Hog (*Potamochoerus porcus*) (Wildlife Department, 1994).

The reserve is surrounded by farming communities with a complexity of issues concerning livelihood challenges, ethnicity and tenure rights. The people are predominantly farmers who engage in traditional rain fed agriculture, employing a slash and burn method of land clearing. Farm sizes averaged less than one hectare. A variety of crops including yam, maize, paddy rice, groundnuts, cassava, cowpeas and vegetables, are cultivated for subsistence, with the surplus sold at nearby urban markets.

The fringe communities were ethnically diverse, comprising indigenous Asante and a high migrant population originating mostly from northern savannah areas of West Africa. The influx of a high migrant population over the past decades, coupled with natural increase in the population of the indigenes has led to a high rise in the population of major settlements in the area. Population data from Ghana Statistical Service indicate that between 1960 and 2010, the population of fringe communities increased by 600 percent on the average (GSS, 1984, 2014). The migrants are most widespread in the northern fringes of the reserve whilst the indigenous Asante dominate the southern fringes. The migrants engage in leasehold agreements and make payments to their landlords. The traditional Heads of Kwamang and Kumawu (two of several sub-divisions of ethnic Asante) each laid claim to the area before the establishment of the reserve. The issue of who should receive compensation from the government of Ghana for the expropriation of the land for the reservation has

Table 2: The Rapid Assessment and Prioritization of Protected Areas Management Methodology Scoring System

		score			
		1	2	3	4
Activity	Extent	Localised (1)	Scattered (2)	Widespread (3)	Throughout (4)
	Impact	Mild (1)	Moderate (2)	High (3)	Severe (4)
	Permanence	short-term (1)	medium term (2)	long-term (3)	Permanent (4)
	Highest score ¹	1	8	27	64

¹ Highest score arrived at by multiplication of individual scores

therefore remained unresolved, thus fuelling local opposition (Ofori et al., 2014).

Methods

Primary data were derived from a combination of approaches namely the Rapid Assessment and Prioritization of Protected Areas Management (RAPPAM) methodology (Ervin, 2003), participatory rural appraisal approach and institutional data gathering.

The RAPPAM methodology is based on the IUCN WCPA management effectiveness framework, designed as a tool for developing assessment systems for protected areas (Ervin, 2003; Hockings et al., 2006). The methodology was employed at a fact-finding participatory workshop organized by the authors from 16 to 17 January 2012 at the University of Ghana, Accra. The assessment, which involved seven other protected areas, provided data for the management effectiveness evaluation of these protected areas (Ayivor, 2012). However, for the purpose of this study, only the results on pressures and threats for the Kogyae Strict Nature Reserve were considered relevant and used for the current analysis.

In the IUCN WCPA management effectiveness framework, pressure refers to processes, actions or events that have already had detrimental impact on the integrity of the protected area. Threats on the other hand are potential activities, processes or events that are impacting or likely to have detrimental impact in future. A total of 25 participants, comprising protected area managers and administrators, academic staff and representatives from non-governmental organizations, attended the workshop. The questions format consisted of statements with four options and different scoring systems. For pressures and threats, which was an aspect of the 'context' component, activities were assessed on the basis of extent, impact and permanence. The degree of intensity, 'extent' can be 'localized' with a score of one (1); 'scattered' a score of two (2); widespread (3); and throughout (4). The 'impact' was assessed as mild with a score of one (1); 'moderate' a score of two (2); 'high' a

score of three (3) or 'severe' a score of four (4). 'Permanence' also has four scoring levels as follows: short-term (1), medium term (2), long-term (3), permanent (4). The overall score was derived at by multiplication of individual scores (see Table 2).

The participatory rural appraisal approach (Chambers, 1994), with a focus on group discussions and individual interviews, was employed by a three member research team. This involved the engagement of both community members and Officials of the Wildlife Division in separate focus group discussions in an interactive manner with the help of a checklist to solicit participants' views on key issues relating to the management of the reserve. The group discussions took place in May 2013 and covered 13 fringe communities selected on the basis of their proximity to the reserve and geographical spread (Figure 1). Each group comprised seven (7) to 25 adult participants aged 18 to 75 years. Community leaders, namely local assemblymen and agents of traditional chiefs, helped in the selection of participants. Males constituted 54 per cent of the participants while females made up 46 per cent. Pertinent issues that provoked interesting discussions among the participants such as land tenure issues, inter-relationship between Wildlife Division officials and local communities, and sources, nature and impacts of threats to the protected area were considered. At the end of each discussion, the participants were asked to make their own recommendations as to the way forward. In total, 120 participants were involved including 10 Officials of the Wildlife Division. Separate interviews were also conducted with the Protected Area Manager and his Deputy.

Data on animal sightings were derived from field records at the District Office of the Wildlife Division at Ejura. The data comprised monthly records of animals sighted from 2005 to 2012 by the patrol staff of the Wildlife Division. The animal sightings are based on a standard method prescribed by the Wildlife Division, whereby their patrol staff routinely keep records of all species of wild animals that they encounter randomly as they carry out daily



An interactive meeting with Officials of the Wildlife Division at Dome Base Camp © Jesse Ayivor

patrol of the reserve. The method provides only rough estimates of species occurrence and abundance in a protected area as it does not rule out the tendency for double counting.

RESULTS AND DISCUSSIONS

Results of management effectiveness evaluation

The results from the evaluation of management effectiveness of the Kogyae Strict Nature Reserve showed that nine processes, actions or events constituted pressures and threats facing the reserve. These were annual bush fires, adjacent land use, agricultural encroachment, invasive species, poverty in nearby communities, settlement establishment, human population density, poaching, and infrastructure development (Figure 2). In terms of pressures, adjacent land use and poverty in nearby communities were the most serious, followed by invasive species, illegal entry including poaching and high human population density. With regard to threats, annual bush fires was identified as the most severe, followed by adjacent land use, agricultural encroachment, invasive species, poverty in nearby communities and settlement establishment (Figure 2).

Studies have shown that the major underlying threats to PAs are the affluence of the richest quarter of the world population and poverty among the poorest proportion of

the world's population. These in turn are related to other underlying issues including international debt and the flow of resources from the poor to the rich, pressure for trade and development, land tenure, population pressure, social relations, corruption, inequality, lack of capacity, lack of education and war and conflict (IUCN, 1999).

A critical assessment of the list of pressures and threats from the management effectiveness evaluation results suggests that they could be categorized into underlying and proximate pressures and threats or both. As illustrated in Figure 3, the underlying threats and pressures include: adjacent land use, poverty in nearby communities, and high population density. These are classified as such because they are predisposing factors that tend to fuel or promote human activities which negatively undermine the integrity of the reserve. Whilst the remaining list of six threats and pressures may be described as proximate or causal factors because they all have direct impact on habitats, species richness and composition, four out of the six have the tendency to fuel the occurrence of others. Thus, poaching, grazing, agricultural encroachment and settlement establishment may either impact on each other as underlying pressures and threats, or may promote bush fires and invasive species, which ultimately have direct impacts on habitat fragmentation or biodiversity loss.

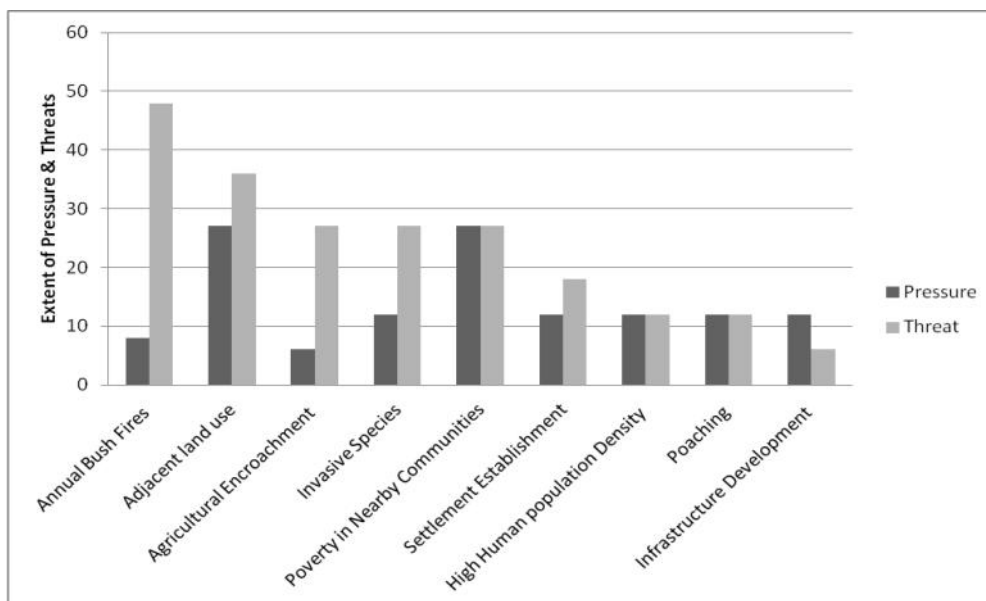


Figure 2: Pressure and threats facing the Kogyae Strict Nature Reserve

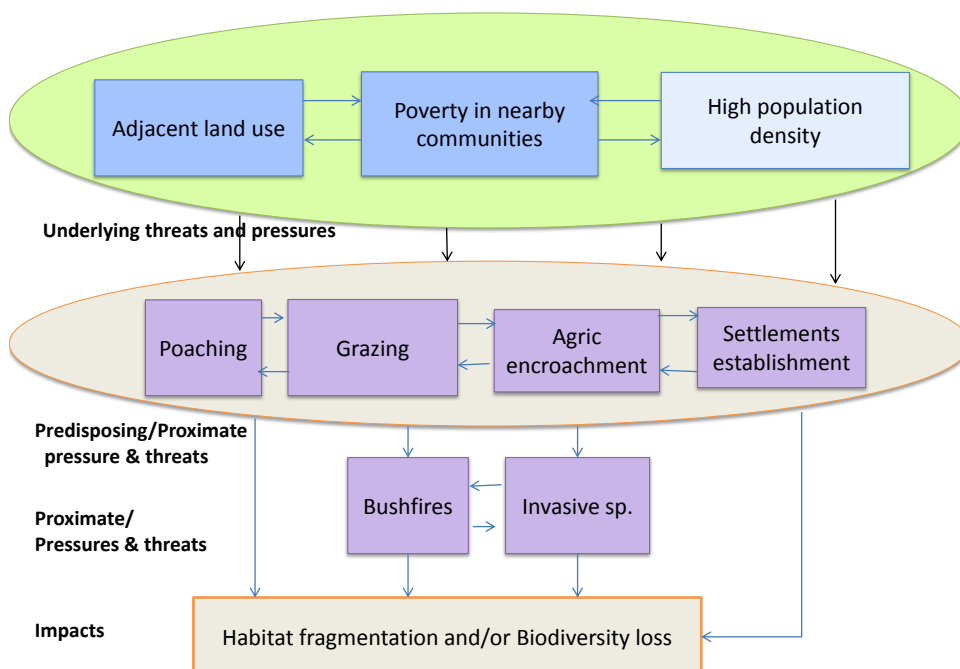


Figure 3: Proximate and underlying threats facing the Kogyae Strict Nature Reserve

With regard to adjacent land use as a pressure, official data from the Statistics, Research and Information Directorate of the Ministry of Food and Agriculture indicated that cropped area for major crops cultivated in Ejura Sekyedumase District within the vicinity of Kogyae Strict Nature Reserve, had been on an increasing trend over the years. The records showed that the percentage increase in cropped area from 2005 to 2014 for maize was 30 per cent, rice 94 per cent, cassava 12 per cent and yam 17 per cent (SRID/MOFA, 2014) (Figure 4).

Socio-economic context and associated pressures and threats

Field data indicated that net farming incomes in the area were low because of low productivity resulting from short fallow periods, dependence on natural nutrient

replenishment, impoverished soils, and changing climatic conditions, manifested in prolonged droughts and variations in rainfall amounts, seasonality and intensity. Available data from Ejura Sekyedumase District revealed that the percentage increase in crop yield in MT/Ha did not commensurate the percentage increase in cropped area (Figure 4). Apart from cassava, which according to Okogbenin et al. (2013) can tolerate harsh natural conditions such as drought, the percentage increase in cropped area for all the major crops far exceeded the yield in MT/Ha.

One observation worthy of note was the closeness of crop farms and settlements to the strict nature reserve. This would account for the relatively higher score for ‘adjacent land use’ both as a pressure and threat in the management effectiveness evaluation.

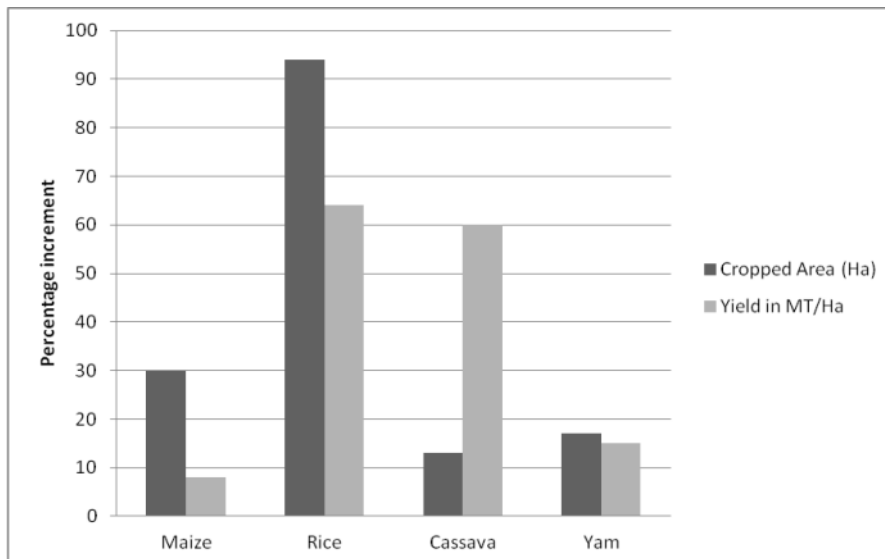


Figure 4: Percentage increment in cropped area/Ha as against yield MT/Ha from 2005 to 2014



Maize farm sited close to Kogyae Strict Nature Reserve border along the Oko Junction – Dome road © Jesse Ayivor

As a result of disagreements over the land on which the reserve is located between the two traditional groups claiming ownership (Kwamang and Kumawu), there has been no compensation payment by the Government of Ghana to any of the parties since the reserve was established. In addition to this, the area designated as a Special Use Zone (SUZ) was also under contention between the local people and the Wildlife Division. This raises questions of legal insecurity and had triggered apprehension and resentment among a section of the local people.

Special Use Zone (SUZ)

Most of the socio-economic stressors of the reserve emanate from SUZ, whose creation was the outcome of a conflict resolution process initiated by World Vision International (an NGO) in 1994. The process was to resolve the land ownership disagreements between local

communities and the Wildlife Division. The SUZ was established after a series of consultative meetings between 1993 and 1994 organized by stakeholders to mediate between the local people and the Wildlife Division. During the negotiations, the extended portion was to be designated, de jure, as SUZ, but with a catalogue of responsibilities and restrictions. The communities agreed to the proposals in principle but on condition that their expectations would be met. Paramount among these was that the SUZ should be de-gazetted to allow for the cultivation of tree crops such as cashew, oil palm, citrus and teak in the area. They also wanted access to dead and dying trees on their farms for charcoal or timber production because according to them, the government had once granted a private company a licence to do same.

The Wildlife Division, however, maintained that the government has no intention to de-gazette the SUZ because doing so will reduce the effective size of the reserve and compromise its ecological integrity. Moreover, investment in permanent tree crops within the SUZ has legal and ownership rights implications which might contradict the Wildlife Regulations Act of 1971.

Following further consultations, the local community representatives signed a memorandum of understanding (MoU) with the Wildlife Division on the creation of the SUZ, which states that:

- the SUZ is still an integral part of the Kogyae Strict Nature Reserve; it has not been de-gazetted and Wildlife Reserves Regulation, 1971 L.I. 710 would be enforced in the zone;
- group hunting is prohibited;
- charcoal burning is forbidden by law;
- logging in the SUP is absolutely prohibited;



Access road constructed through the Kogyae Strict Nature Reserve for residents in the SUZ © Jesse Ayivor

- farming activities close to water bodies (50 metres on both sides of the body) are prohibited;
- no farming beyond the SUZ boundary, any farms made beyond the SUZ would be destroyed and the culprit expelled from the zone;
- by-laws would be made to guide the use of the SUZ;
- use of fire in the area to be restricted to avoid uncontrolled bush fires; and
- distillation of local gin (akpeteshie) is prohibited.

The Wildlife Division and District Assemblies together with other stakeholders were to facilitate and spearhead the modernization of agriculture through mechanization and good soil management techniques in the SUZ. Unfortunately, government reneged on its promise due to budgetary constraints; and this has fuelled local agitations against the creation of the SUZ. Responses in almost all focus group discussions suggested that the reserve contributes nothing to the local socio-economic wellbeing. In the view of one respondent: *'the prohibitions imposed on the SUZ have negated all our efforts at optimizing the economic potential of our God-given land, which is our only resource'*.

Michener (1998) described the approach used in the local consultation for the creation of the SUZ as 'planner-centred' participatory conservation where external agents with other interests facilitate local people's acceptance of new innovations promoted by the agents. The local opposition to the creation of the SUZ also brings into question the legitimacy of representation of stakeholders in the negotiation process, which according

de Vente et al., (in press), is a major determinant of success of the participatory approach. According to Cernea and Schmidt-Soltau (2003) if no strategy is put in place to secure the livelihoods of those who feel aggrieved in protected area establishment, the result will always be aggravated poverty in communities bordering the protected area. Poverty in nearby communities was identified as a major underlying pressure and threat facing Kogyae Strict Nature Reserve, hence any action that further affects the livelihoods of the people negatively will invariably increase the proximate pressure and threats and potentially erode biodiversity in the Strict Nature Reserve.

Another local livelihood-related challenge was the incessant animal raids on farms located close to the reserve. On-site observations revealed that farms were established along the immediate fringes of the reserve and within the SUZ, thus exposing the farms to raids by Patas monkey (*Erythrocebus patas*), red river hog (*Potamochoerus porcus*), bushbuck (*Tragelaphus scriptus*), ground squirrels (*Otospermophilus beecheyi*), crested francolin (*Dendroperdix sephaena*) and grasscutter (*Thryonomys swinderianus*). The respondents in the focus group discussions estimated that between one quarter and half of their farm produce was destroyed through animal raids on an annual basis. Most of the respondents intimated that they killed animals which raided their farms for bushmeat with snares and other hunting techniques. This confirms the results of the management effectiveness evaluation exercise which indicated that 'adjacent land use' was both a serious pressure and threat.



Annual bush burning in the SUZ is a major cause of habitat degradation in Koggyae Strict Nature Reserve © Jesse Ayivor

Officials of the Wildlife Division admitted that it was difficult to convince the local people to collaborate because the Strict Nature Reserve was not enhancing local livelihoods. Though this problem was anticipated, they thought that decline in soil fertility through human population pressure and lack of social amenities would make the area unattractive for continuous settlement and compel the residents to vacate the area voluntarily. This did not happen because some of the hitherto deprived communities were later provided with good access roads, potable water and schools either by politicians as fulfilment of campaign promises, or by NGOs who did so on humanitarian grounds. One worrying trend was the inability of the SUZ to support livelihood as a result of soil exhaustion and climate variability, leading to a shift to farming in wetlands. One of the respondents had this to say: *'Access to land in this area has become very difficult compelling us to farm on the same piece of land on an annual basis. I have been cultivating the plot allocated to me over 10 years now, and have noticed a drastic reduction in yield. Seasonality of rainfall has also changed whilst most of our lands outside the reserve are very rocky. This has prompted me to move into wetland areas to start rice farming.'*

It is clear from the findings that the design of the SUZ and the way it is used, to sustain total livelihoods rather than supplementing them, constitutes a major underlying pressure and threat to the reserve. Under the design, the zone serves as a hub where most of the illegal human activities were initiated.

Bush Fires

Both Officials of the Wildlife Division and local residents claimed that there had been a change in the frequency, seasonality and intensity of rainfall in the area over the past decades. This observation is substantiated by the observation by Owusu and Waylen (2009) that between 1950 and 2000, annual rainfall totals for Ejura (nearest station to Koggyae) had dropped from 1800mm to about 1600mm. Presently, rainfall variability has resulted in the occurrence of prolonged droughts which, together with other factors, make the area susceptible to bush fires.

Bush fires ranked highest as a threat in the results of the assessment of pressures and threats (Figure 2). The problem was very widespread and directly affects species protection and undermines the effectiveness of Koggyae as

Table 3: Number of Animals sighted in Kogyae (2005 – 2012). Source: Wildlife Division, Ejura.

Animals Sightings	2005	2006	2007	2008	2009	2010	2011	2012
Baboon	30	159	349	502	1655	2249	2323	1074
Bay duiker	0	8	6	32	27	53	36	1
Black and white colobus	4	1	0	0	0	0	0	0
Black duiker	5	11	22	49	704	1004	924	3
Buffalo	0	102	30	16	74	57	78	146
Bushbuck	87	616	757	771	1118	1893	1060	852
Green monkey	79	185	131	97	693	1006	636	61
Hartebeest	0	0	0	0	0	3	0	0
Kob	95	633	405	445	1173	1969	2034	810
Maxwell's duiker	15	55	103	90	426	849	704	173
Mona monkey	10	97	76	23	25	18	11	25
Oribi	5	101	38	49	37	60	7	0
Patas monkey	186	1332	775	614	1402	1555	2282	749
Red flanked duiker	24	90	42	135	193	736	521	218
Red river hog	4	140	136	77	577	1108	736	165
Warthog	21	288	156	111	645	895	1443	27
Waterbuck	0	19	14	6	35	101	63	43
White spot-nosed monkey	4	75	27	34	855	1223	638	0
Total	569	3912	3067	3051	9639	14779	13496	4347

a Strict Nature Reserve. Whereas Officials of the Wildlife Division blamed the origin of the annual wild fires on the residents of the SUZ, the residents, in turn, alleged that the fires were usually initiated from the core zone, a location accessible to only Officials of the Wildlife Division.

Interviews with Officials of the Wildlife Division gave the following reasons as the major causes of the fires:

- Fulani herdsmen who intentionally burn dried grass during the dry season to induce the early sprouting of fresh grass to provide grazing for their cattle;
- hunters who initiate fires to force animals out of their hideouts; and
- careless handling of naked fires by palm wine tappers, local gin distillers, farmers and cigarette smokers.

It was also revealed that the occurrence of intermittent open grassland areas mostly over lateritic and rocky soils surfaces within the reserve, where deep-rooted trees were absent, was a major underlying factor that fuelled the bushfires. During the dry seasons, the grasses dry up quickly and become susceptible to fires. Additionally, several forest gaps created by the fires were taken over by the prolific invasive plant species, *Chromolaena odorata*. This plant produces a lot of flammable litter which increases the risk of fire. One disturbing issue was that

during the fire outbreaks, wild animals from the reserve sought refuge in sheltered areas in and around the communities, thus exposing the animals to human predators. Officials of the Wildlife Division reported that they encountered burnt carcasses of young animals after almost every fire event. One respondent who strongly expressed reservations over the creation of the reserve, particularly the SUZ remarked: *'The forest is an empty forest. Fire sweeps through it every year and causes most of the animals to escape. There is nothing in the reserve to attract tourists. The forest brings no benefits to us. We should be allowed to occupy our lands'*.

All the above explain the gravity of fire impacts on the Strict Nature Reserve and suggest that the reserve was far from meeting the values and objectives for which it was established.

Effects of pressures and threats on animal populations

According to the Officials of the Wildlife Division, the intensification of human activities is having a negative impact on the animal population in the Kogyae Strict Nature Reserve. They indicated that the seasonal migration of elephants from Digya National Park had ceased as a result of habitat degradation. Institutional data obtained from the Division on animal sightings from



Carcass of a white spot-nosed monkey trapped for bushmeat © Jesse Ayivor

2005 to 2012 (Table 3) indicate that whereas the sightings of certain mammalian species fluctuated within the period and showed no regular trend, the sightings of other known species in the area such as Black and White Colobus, Hartebeest and Oribi suggest that they were becoming locally rare. Further studies using a more robust methodology are required to ascertain the current status of wild animals species in order to draw valid conclusions.

Though some authors have argued that protected areas in tropical countries have been effective in protecting ecosystems and species within their borders in the face of inadequate funding and significant land-use pressure (Bruner et al., 2001; Geldmann, et al., 2013; Green et al., 2013), others believe that the common perception of protected areas as cornerstone of biodiversity conservation cannot always be true (Liu et al., 2001, Pfeifer et al., 2012). Using the results of an empirical study in Wolong Strict Nature Reserve in south-western China, Liu et al. (2001) observed ecological degradation of panda habitat inside the reserve, which resulted in a drastic reduction in panda population from 145 in 1974 to 72 in 1986. The study attributed this phenomenon to the activities of the human population inside the reserve which surged from 2,560 in 1975 to 4,260 in 1995. They concluded that in order to understand better the effectiveness of protected areas as a strategy for biodiversity conservation, both ecological and socio-economic factors should be taken into consideration.

Kogyae and Wolong bear several similarities. Apart from the fact that both are Strict Nature Reserves, there are also the activities of increasing human populations inside the reserves which impact negatively on the conservation of species. The general conclusion that both ecological and socio-economic factors may partly be responsible for the effectiveness of protected areas also applies. However, based on the Kogyae experience, the assertion that protected areas as cornerstone of biodiversity conservation is just a common perception and cannot always be true may strongly be refuted. Despite the challenges of Kogyae, it still maintains a fair number of species which cannot be found in the adjacent landscape and other unprotected lands. The issue for Kogyae is more about the questionable designation as a Category Ia protected area than its ability to protect biodiversity.

CONCLUSIONS

The Kogyae Strict Nature Reserve is bedevilled by several socio-economic stressors emanating from increasing livelihood demands, compounded by the extension of the boundaries of the Strict Nature Reserve to include community farm lands. Thus, whereas poverty in fringe communities and adjacent land use may appear as the main sources of pressures and threats facing the Strict Nature Reserve, the root cause was attributed to the southwards extension of the reserve to cover the Afram river channel and beyond. Though the expansion was necessary to maintain an ecologically viable reserve size

and to ensure adequate water supply for wild animals, the 'planner-centred' participatory approach employed in the zoning process failed to involve fully the local stakeholders whose livelihoods were directly affected. The subsequent creation of the SUZ has rather compromised the integrity of the Strict Nature Reserve, as it has now become a hub for illegal activities such as the initiation of bush fires and poaching.

The anticipated benefits of the SUZ are also not being realized since it could not meet the ecological needs of the reserve and livelihood expectations of the people at the same time. This has resulted in intense pressures and threats which have affected habitats, as well as, animal populations. In particular, the occurrence of certain known species in the reserve such as Black and White Colobus and Hartebeest has become very doubtful in recent times. With increasing climatic changes, these challenges, in particular bushfires and dwindling species diversity are likely to be compounded if appropriate measures are not put in place to check them. As a matter of urgency, more stringent measures need to be put in place to control poaching and bush fires if indeed the Forestry Commission of Ghana is truly committed to maintaining the integrity of Ghana's only Strict Nature Reserve. This will require intensification of patrol efforts through staff capacity enhancement and additional funding.

Two medium to long term measures are recommended to address the problem of the SUZ. In the first place, maintaining the status of Kogyae as a 'Strict Nature Reserve' calls for an exclusionary approach that will mean relocating all communities in the SUZ in order to extend the core zone over the Afram River. This would increase the effective size of the core zone, ensure uninterrupted access to water supply for wild animals and reduce the pressures and threats faced by the reserve. For this approach to succeed there will be the need for massive capital injection from central government to implement a comprehensive resettlement programme and to pay adequate compensation to all affected persons. It also calls for the provision of sustainable livelihood activities in the resettlement communities to curtail the adverse effects of resettlement programmes on livelihoods.

The other option is an inclusionary approach that will grant the communities' request to engage in ecologically friendly activities such as cultivation of perennial cash crops in the SUZ while maintaining the core zone. Such an approach will call for a re-categorization of the protected area from Category Ia to Category VI, which encourages the use of natural resources sustainably as a means to achieving nature conservation, according to IUCN definition.

Along with the re-categorization, the establishment of Community Resource Management Area (CREMA) will help to curtail the incidence of bush fires in the area. CREMA is a concept which seeks to build the capacity of local communities and provide them with incentives to sustainably manage and conserve natural resources

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Rocky surfaces of Kogyae are usually covered by grass, which become susceptible to fires during the dry season © Jesse Ayivor

REFERENCES

- Attuquayefio, D.K. and Fobil, J.N. (2005). Overview of biodiversity in Ghana: Challenges and prospects. *West African Journal of Applied Ecology*. 7(1), 1-18. <http://dx.doi.org/10.4314/wajae.v7i1.45621>
- Ayivor, J.S., Gordon, C. and Ntiamao-Baidu, Y. (2013). Protected area management and livelihood conflicts in Ghana: A case study of Digya National Park. *PARKS*. 19(1), 37-50. DOI: 10.2305/IUCN.CH.2013.PARKS-19-1.JSA.en
- Ayivor, J.S., 2012. Evaluation of management effectiveness of protected areas in the Volta Basin of Ghana. A dissertation submitted to the University of Ghana, Legon, in partial fulfilment of the requirement for the award of PhD Environmental Science Degree. University of Ghana, Legon (Passed and awarded).
- Bruner, A.G., Gullison, R.E., Rice R.E. and Fonseca, G.A.B. (2001). Effectiveness of parks in protecting tropical biodiversity. *Science* 29(1), 25-128. DOI: 10.1126/science.291.5501.125
- Cernea, M.M. and Schmidt-Soltau, K. (2003). Biodiversity conservation versus population resettlement: Risks to nature and risks to people. Paper presented at the International CIFOR Conference on 'Rural Livelihoods, Forests and Biodiversity' Bonn, Germany. 19-23May 2003.
- Chambers, R. (1994). Participatory rural appraisal: Challenges, potentials and paradigm. *World Development*, 22(10), 1437-1454. DOI:10.1016/0305-750X(94)90030-2
- Chapes, S., Spalding, M. and Jenkins, M. (2008). The world's protected areas: Status, values and prospects in the 21st century. Prepared by UNEP-WCMC. Berkeley: University of California Press.
- Chicchon, A. (2000). Conservation theory meets practice. *Conservation Biology*. 14(5). DOI: 10.1046/j.1523-1739.2000.00200.x
- De Vente, J., Reed, M.S., Stringer, L.C., Newig, J., Valente, S., (in press). How do context and design of participatory decision-making processes influence their outcomes? *Journal of Environmental Management* (in press).
- Dovers, S., Feary, S., Martin, A., McMillan, L., Morgan, D. and Tollefson, M. (2015). Engagement and participation in protected area management: who, why, how and when?, in G. L. Worboys, M. Lockwood, A. Kothari, S. Feary and I. Pulsford (eds) *Protected Area Governance and Management*, ANU Press, Canberra pp. 413-440,.
- Dudley, N. (Ed.). (2008). *Guidelines for Applying Protected Area Management Categories*. Gland, Switzerland: IUCN.
- Dyer, J., Stringer, L.C., Dougill, A.J., Leventon, J., Nshimbi, M., Chama, F., Kafwifwi, A., Muledi, J.I., Kaumbu, J.-M.K., Falcao, M., Muhorro, S., Munyemba, F., Kalaba, G.M., Syampungani, S. (2014). Assessing participatory practices in community-based natural resource management: Experiences in community engagement from southern Africa. *Journal of Environmental Management*. 137 (2014) 137-145. <http://dx.doi.org/10.1016/j.jenvman.2013.11.057>
- Environmental Protection Agency (EPA). (1996). *Environmental Protection Agency at a glance*. EPA, Accra, Ghana.

- Ervin, J. (2003). *WWF Rapid Assessment and Prioritization of Protected Area Management (RAPAM) Methodology*. Gland, Switzerland: WWF.
- Geldmann, J., Barnes M., Coad L., Craigie I.D., Hockings M., Burgess, N.D. (2013). Effectiveness of terrestrial protected areas in reducing habitat loss and population declines. *Biological Conservation* 161:230-238. DOI:10.1016/j.biocon.2013.02.018
- Ghana Statistical Service (GSS). (1984). Population census – 1984. Ghana Statistical Service, Accra.
- Ghana Statistical Service (GSS). (2014). 2010 Population and housing census of Ghana. Ghana Statistical Service, Accra
- Green, J.M.H., Larrosa, C., Burgess, N.D., Balmford, A., Johnston, A., Mbilinyi, B.P., Platts, P.J., Coad, L. (2013). Deforestation in an African biodiversity hotspot: Extent, variation and the effectiveness of protected areas. *Biological Conservation* 164 (2013) 62–72. DOI:10.1016/j.biocon.2013.04.016
- Hagan, J.E. (1998). The Kogyae Strict Nature Reserve. The World Bank/WBI's CBNRM Initiative. GIMPA, Accra-Ghana.
- Hockings, M., Stolton, S., Leverington, F., Dudley, N. and Corrau, J. (2006). *Evaluating effectiveness: A framework for Assessing Management Effectiveness of Protected Areas*. 2nd Edition, IUCN WCPA and University of Queensland, Gland Switzerland and Brisbane Australia.
- International Union for Conservation of Nature (IUCN). (1999). *Threats to Forest Protected Areas. Conversion of 'Paper Parks' to Effective Management – Developing a Target*. A Research Report from IUCN The World Conservation Union for the World Bank/WWF Alliance for Forest Conservation and Sustainable Use.
- Jachmann, H. (2007). Monitoring law-enforcement in nine protected areas in Ghana. *Biological Conservation*. 141, 89-99.
- Jachmann, H. (2008). Illegal wildlife use and protected area management in Ghana. *Biological Conservation*. 141, 1906-1918. DOI: 10.1016/j.biocon.2008.05.009
- Juffe-Bignoli, D., Burgess, N.D., Bingham, H., Belle, E.M.S., de Lima, M.G., Deguignet, M., Bertzky, B., Milam, A.N., Martinez-Lopez, J., Lewis, E., Eassom, A., Wicander, S., Geldmann, J., van Soesbergen, A., Arnell, A.P., O'Connor, B., Park, S., Shi, Y.N., Danks, F.S., MacSharry, B., Kingston, N. (2014). *Protected Planet Report 2014*. UNEP-WCMC: Cambridge, UK.
- Kyerematen, R., Owusu, E., Acquah-Lampsey, D., Anderson, R. and Ntiamao-Baidu, Y. (2014) Species composition and diversity of insects of the Kogyae Strict Nature Reserve in Ghana. *Open Journal of Ecology*, 4, 1061-1079. DOI: 10.4236/oje.2014.417087
- Liu, J., Linderman, M., Ouyang, Z., An, L., Yang, J. and Zhang, H. (2001). Ecological degradation in protected areas: The case of Wolong Nature Reserve. *Science* 292(5514), 98-101. DOI: 10.1126/science.1058104
- Michener, V. (1998). Participatory approach: Contradiction and co-option in Burkina Faso, *World Development*, 26 (12), 2105-2118.
- Mulongoy, K.J. and Chape, S. (2004). *Protected areas and biodiversity: An over view of key issues*. Montreal, Canada and Cambridge, UK: CBD Secretariat and UNEP-WCMC.
- Mustalahti, I., Lund, J.F. (2009). Where and how can participatory forest management succeed? Learning from Tanzania, Mozambique, and Laos, *Society & Natural Resources*, 23:1, 31-44, DOI: 10.1080/08941920802213433
- Ofori, B.D., Nukpezah, D., Ayivor, J.S., Lawson, E.T. and Gordon, C. (2014). Leadership, local knowledge and water management: Lessons from fringe communities of the Kogyae Strict Nature Reserve, Ghana. *International Journal of Development and Sustainability*.3(2), 353-370.
- Oduro-Ofori, E., Ocloo, E.K.A., Peparah, C., Effah, G. (2015). Assessing Natural Resource Use Conflicts in the Kogyae Strict Nature Reserve. *Environment and Natural Resources Research*. 5(3):56-71 DOI:10.5539/enrr.v5n3p56
- Okogbenin, E., Setter, T.L., Ferguson, M., Mutegi, R., Ceballos, H., Olanmi, B. and Fregene, M. (2013). Phenotypic approaches to drought in cassava: Review. *Frontiers in Physiology* 10(4), 93. DOI: 10.3389/fphys.2013.00093. eCollection 2013. PMID: 23717282
- Owusu, K. and Waylen, P. (2009). Trends in spatio-temporal variability in annual rainfall in Ghana (1951-2000). *Royal Meteorological Society*. 64(5), 115-120. DOI: 10.1002/wea.255
- Pfeifer, M., Burgess, N.D., Swetnam, R.D., Platts, P.J., Willcock, S., Marchant, R. (2012). Protected Areas: Mixed Success in Conserving East Africa's Evergreen Forests. *PLoS ONE* 7(6): e39337. DOI:10.1371/journal.pone.0039337
- Statistics, Research and Information Directorate (SRID), Min. of Food and Agriculture. (2014). Cropped Area for major crops in the Ashanti Region 2014. Ministry of Food and Agriculture, Accra. Dec. 2014
- Terborgh, J. and van Schaik, C. (2002). Why the world needs parks. In: M. Rao, (Ed.) *Making parks work: Strategies for preserving tropical nature*. Pp. 3-14. Washington, DC: Island Press.
- Wildlife Department. (1994). Kogyae Strict Nature Reserve National Park Management Plan. Wildlife Division. Accra.
- Wildlife Division. (2002). An action plan for biodiversity conservation and sustainable livelihood in the 'Special Use Zone'. Kogyae Strict Nature Reserve. Wildlife Division of Forestry Commission, Ghana.

RESUMEN

El estudio evaluó la integridad de Kogyae, la única Reserva Natural Estricta de Ghana, como un área protegida de categoría Ia, en el contexto de las presiones y amenazas que representan los factores antropogénicos. Los datos primarios se obtuvieron a partir de una combinación de enfoques, a saber, Metodología para la evaluación y priorización rápidas del manejo de áreas protegidas (RAPPAM), enfoque de diagnóstico participativo y recolección de datos institucionales. Los resultados identificaron el uso del suelo adyacente, la pobreza en las comunidades cercanas, y la gran densidad de población como las amenazas subyacentes que afronta la reserva. Estas habían impulsado las amenazas inmediatas, incluyendo los incendios forestales, la tala y la caza furtiva. El estudio reveló también que la reciente rezonificación de la reserva mediante la ampliación de sus fronteras para mejorar su viabilidad ecológica no solo ha dificultado la relación entre los pobladores de la zona y los funcionarios de la División de Vida Silvestre, sino que se ha convertido en la causa fundamental de la mayoría de las amenazas subyacentes. Considerando la presión y las amenazas de Kogyae, el estudio propone dos opciones para resolver la situación: acceder a la solicitud de las comunidades para participar en actividades ecológicamente amigables en la Zona de uso especial mediante la recategorización de la zona de acuerdo a la definición de la UICN, o el reasentamiento de las comunidades en otros lugares para liberar la reserva de las actividades humanas.

RÉSUMÉ

Ce document a évalué l'intégrité de la seule réserve naturelle intégrale au Ghana, Kogyae, en tant qu'aire protégée de catégorie Ia, dans le contexte de pressions et de menaces posées par des facteurs anthropiques. Les données primaires ont été obtenues à partir d'une combinaison d'approches: le RAPPAM (l'évaluation rapide et la hiérarchisation des aires protégées), l'évaluation participative et la collecte de données institutionnelles. Les résultats indiquent que l'utilisation des terres adjacentes, la pauvreté dans les communautés voisines, et la forte densité de population sont des menaces sous-jacentes qui pèsent sur la réserve. Celles-ci alimentent des menaces de proximité, telles des feux de brousse, l'exploitation forestière et le braconnage. L'étude a révélé également que le récent rezonage de la réserve, en étendant ses frontières afin d'améliorer sa viabilité écologique, a non seulement tendu les relations entre les populations locales et les fonctionnaires de la Division de la Faune, mais constitue en fait la cause principale de la plupart des menaces. Compte tenu de la pression et les menaces qui pèsent sur Kogyae, l'étude propose deux solutions: soit l'octroi de la demande des communautés de se livrer à des activités respectueuses de l'environnement dans les « Zone d'Utilisation Spéciales » et la recatégorisation de la zone de façon appropriée selon la définition de l'UICN, ou bien la réinstallation des communautés ailleurs afin de libérer la réserve des activités humaines.



CONSERVATION IMPLICATIONS OF PROTECTED AREAS' COVERAGE FOR PARAGUAY'S REPTILES

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ABSTRACT

In Paraguay the highest rate of deforestation was reached in the 2000s, and in some places protected areas are the only remnant of the original ecosystem structure. Paraguay currently has 57 protected areas amounting to 15.2 per cent of the country under protection. In this paper we assess the effectiveness of the Paraguayan system of protected areas (SINASIP) for reptiles' conservation. We generate a matrix of taxa × areas according to 1,789 records for 182 taxa. Areas with the highest number of documented species were *Reserva Ecológica Banco San Miguel y Bahía de Asunción* and *Reserva de Recursos Manejados Ñu Guazú*. Eleven protected areas showed no records. Some species are widely distributed in the country and present in several protected areas, but in other cases numerous species have never been recorded in the protected areas. Three nationally (*Phalotris nigrilatus*, *Philodryas agassizii*, and *Rhachidelus brazili*) and one globally (*Philodryas livida*) threatened species are currently without protection in Paraguay, as well as the endemic species *Homonota rupicola*, *Ophiodes luciae*, *Phalotris normanscotti*, and *Phalotris nigrilatus*. At present 90.1 per cent of the total reptiles are found in at least one protected area in the country. Additionally, we show how sampling effort is biased and concentrated around the capital city; and thus a better systematic sampling of the whole country should be considered. Beyond the legal protection provided by protected areas and the strategies to conserve species and their populations, an analysis of the effectiveness of protected areas should be undertaken to secure conservation in perpetuity.

Key words: collecting effort, deforestation, endemism, SINASIP, threatened species.

INTRODUCTION

Protected areas were created as a tool for conserving samples of biological diversity, in the face of the growing crisis of species extinction and the loss of the planet's natural capacity to support human existence as well as the rest of biodiversity (Lopoukhine, 2008). Beyond the role of environmental protection and preservation of natural heritage, protected areas provide additional functions such as contributing to improve human quality of life through poverty reduction, food improvement, and water purification (Dudley & Stolton, 2008; Mansourian et al., 2008; Scherl & Emerton, 2008). Nevertheless, the main objective of any protected area is to protect a representative sample of natural environmental features or certain biodiversity processes of a particular biotic unit (Palacios, 2007).

There are places in the world where human activity places an enormous pressure on the environment – converting natural habitats to productive field crops –

leaving protected areas as the only remnant of an original ecosystem structure (Possingham et al., 2007). A specific example is the Alto Parana Atlantic Forest in Paraguay: this ecoregion has suffered significant loss of cover due to deforestation, and by 2003 only 13.4 per cent of the original cover remained (Di Bitetti et al., 2003), with forest loss reaching its highest rate by the 2000s (Cartes, 2003). In the early 1970s, 73.4 per cent of the ecoregion was covered by forest; since then, the proportion of forested area was quickly reduced to 40.7 per cent by 1989 and further declined to 24.9 per cent by 2000. Paraguay's loss of nearly two thirds of its Atlantic forest between 1973 and 2000, is attributed to two competing deforestation processes: one by settlers and the other by large land owners, with the latter being far more devastating (Huang et al., 2007). In general, protected areas slowed down forest loss within their boundaries; while nearly 40 per cent of Paraguay's Atlantic forests that existed in 1989 were lost by 2000, most protected areas, especially the private ones, lost only small

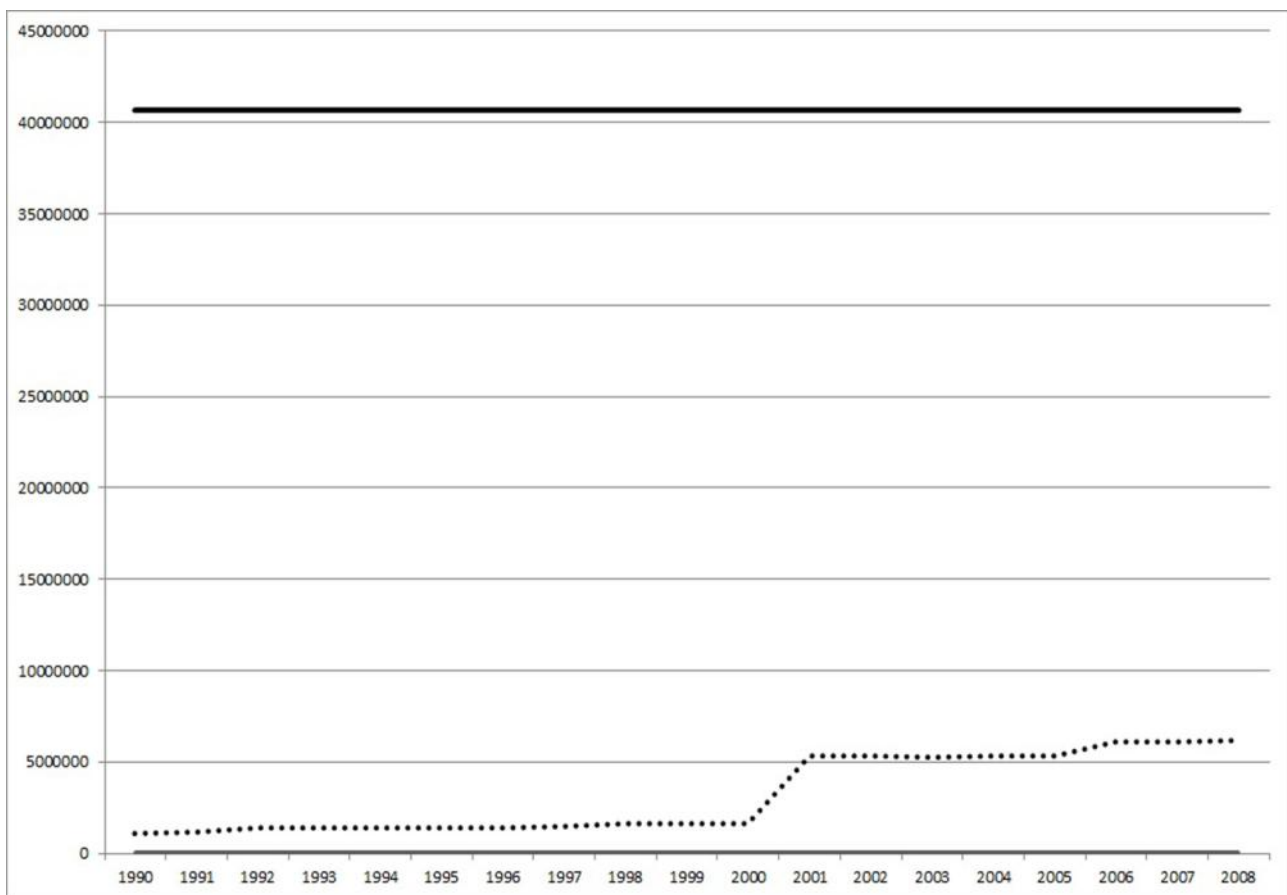


Figure 1: Evolution of protected land area in Paraguay. Black line indicates the area of Paraguay (40,675,200 ha), and dotted line the increase in protected areas to a maximum of 6,170,201 ha, which represents 15.2 per cent of the national territory

proportions of their forest during the same period. However, many of these protected areas remain as isolated ecological islands due to lack of connectivity (Huang et al., 2007).

In an attempt to assess the importance of global ecoregions for conservation, Myers et al. (2000) analyzed the loss of original habitats worldwide and the diversity of endemism in each ecoregion, giving rise to the concept of 'Hot Spots'. In fact, the Atlantic Forest –mentioned previously– and the Cerrado (also present in Paraguay) are considered global hotspots for biodiversity.

Nevertheless, deforestation is not restricted to these ecoregions, and is impacting other forest ecoregions throughout Paraguay. Yanosky (2013) and Bragayrac (2014) showed the negative impact of land use change on the environment and native people in the Chaco. The Gran Chaco Ecoregion (shared with Argentina, Paraguay and Bolivia) is suffering the highest rates of deforestation and protected areas are also being directly affected (Caballero et al., 2014).

The Paraguayan government created the first protected area in 1948 (National Reserve *Cerro Lambaré*), but it was not until 1963 when it first used the term National

Park. Many years later, in 1994, the *Sistema Nacional de Áreas Silvestres Protegidas* (National System of Protected Areas – SINASIP hereafter) was created (Law N° 352/94). Each protected area should have (by law) a core area intended for conservation and a buffer area with the function of reducing negative anthropogenic impacts from outside. This last area is important to prevent or minimize the border effect, and this is the area where activities for the sustainable use of natural resources should be promoted with some specific land-use restrictions. Paraguayan legislation makes the creation of a buffer zone around each protected area mandatory (Law N° 352/94 '*De Áreas Silvestres Protegidas*'). However the actual situation is different, and there are many cases in which the edge of a protected area is abruptly marked by a severe environmental alteration and the absence of ecotones.

Paraguay hosts 30 publically protected areas and 27 in private administration (SEAM, 2009), totalling 6,170,201 ha (or 15.2 per cent of the national territory under legal protection) (Figure 1). The same author states that 58 per cent of the total species of reptiles in the country are protected by SINASIP. Together with fish, reptiles are the least protected groups of vertebrates (SEAM, 2009) (Table 1).

Table 1: Number of vertebrates known for Paraguay (Count), and number present in any protected area of the SINASIP, and percentage of protection for each taxa (based on SEAM, 2009). Reptiles and fishes are the least protected taxa.

Taxa	Count	SINASIP	%
Mammals	194	142	73.1
Birds	700	541	77.2
Reptiles	171	99	57.8
Amphibians	81	64	79.0
Fishes	261	151	57.8

The objective of this paper is to assess the contribution of the SINASIP to conserving reptiles, and to identify species that are currently not protected by the Paraguayan protected areas system, or areas where more scientific research and sampling should be carried out.

METHODS

Paraguay recognizes nine different management categories for conservation areas (Scientific Reserve, National Park, Natural Monument, Wildlife Refuge, Protected Landscapes, Reserve of Managed Resources, Ecological Reserve, Nature Reserve, and Biosphere Reserve). For the purpose of this study we will refer to Protected Areas for all these categories. Officially, the Paraguayan Government recognizes 57 protected areas, (seam.gov.py/images/stories/seam/sinasip/mapa_actualizado_de_sinasip.pdf), which were the focus of this study (Figure 2, Appendix I). Nevertheless, we were not able to obtain information for two new reserves which are not yet legally gazetted: *Reserva Natural de Patrimonio Ayoreo Punie Paseoi* and *Refugio Biologico Yvyty Rokai*. Additionally we made a search on the Protected Planet website (www.protectedplanet.net/ accessed on 1 September 2015) and found that the

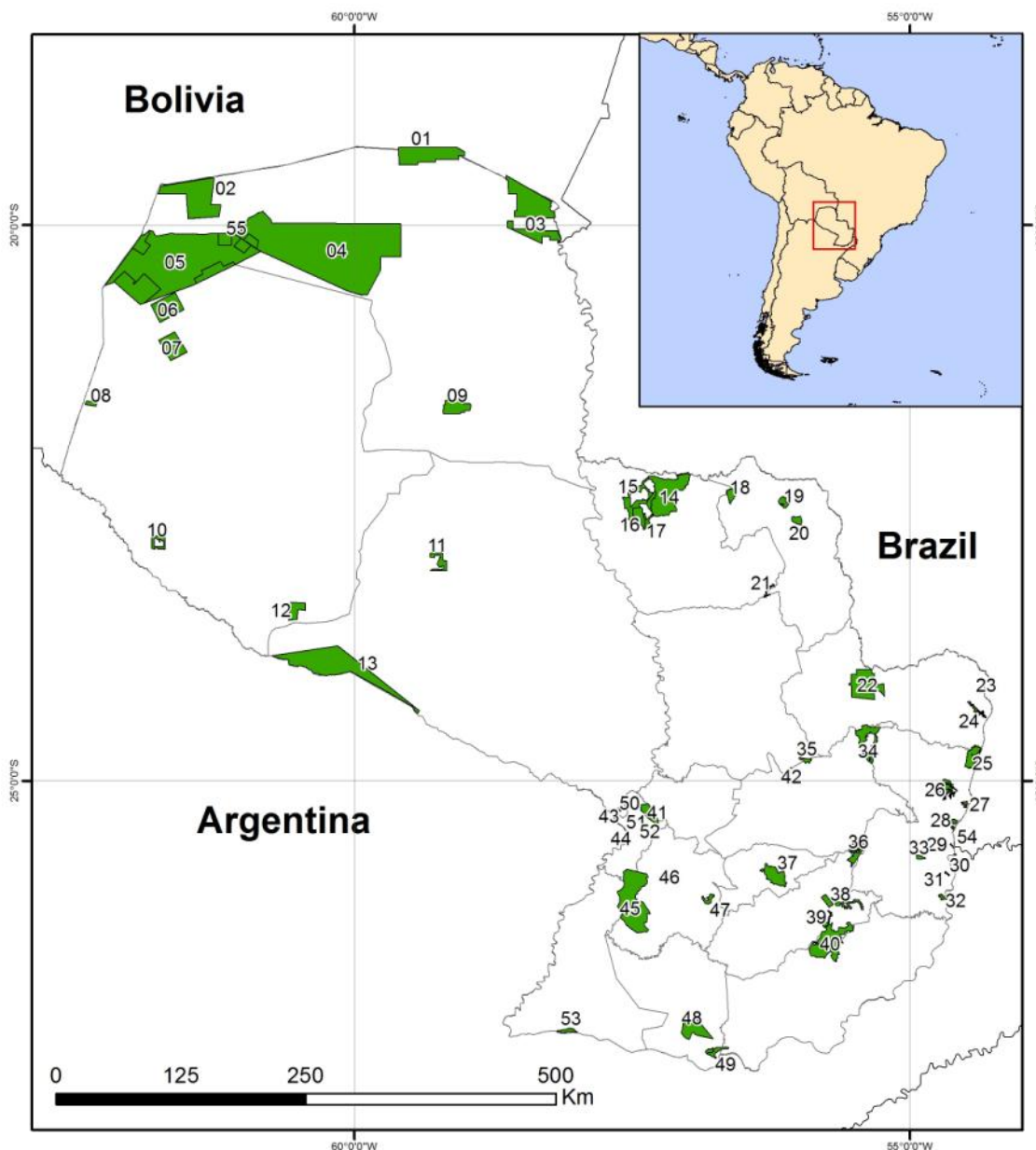


Figure 2: Map of Paraguay showing areas under legal protection. See Appendix I for a key to the numbers

Taxa	Loc.	Glo.	Protection
<i>Phrynops williamsi</i>	VU	NE	1
<i>Salvator duseni</i>	VU	NE	6
<i>Bachia bresslaui</i>	VU	VU	1
<i>Cercosaura ocellata</i>	VU	NE	2
<i>Liolaemus azarai</i>	VU	NE	1
<i>Boa constrictor amarali</i>	VU	NE	6
<i>Epicrates crassus</i>	VU	NE	2
<i>Drymoluber brazili</i>	VU	NE	1
<i>Hydrops caesurus</i>	VU	LC	2
<i>Mussurana quimi</i>	VU	NE	1
<i>Oxyrhopus petola</i>	VU	NE	5
<i>Phalotris nigrilatus</i>	VU	NE	0
<i>Micrurus corallinus</i>	VU	NE	7
<i>Micrurus lemniscatus</i>	VU	LC	1
<i>Norops meridionalis</i>	EN	NE	1
<i>Dipsas bucephala</i>	EN	NE	4
<i>Imantodes cenchoa</i>	EN	NE	5
<i>Philodryas agassizii</i>	EN	NE	0
<i>Philodryas livida</i>	NE	VU	0
<i>Sibynomorphus mikanii</i>	EN	NE	3
<i>Paleosuchus palpebrosus</i>	CR	LC	1
<i>Eunectes murinus</i>	CR	NE	1
<i>Rhachidelus brazili</i>	CR	LC	0
<i>Bothrops jararacussu</i>	CR	LC	4

Table 2: Threatened reptiles in Paraguay (Nat.) after Motte et al. (2009), with the global conservation status (Glo.). Although *Philodryas livida* was NE nationally, it is included because globally it is considered VU. In 'Protection' we indicate the number of protected areas in which those taxa are present. In bold are threatened taxa without protection.

website is in need of updating and some areas (Lago Ypoá, Río Negro, and Tinfunqué) are listed twice; so information available there cannot be used for the Paraguayan protected areas.

We took the base species list from www.reptile-database.org, with some modifications; and follow Carvalho (2013) who does not consider *Tropidurus guarani* a Paraguayan endemic. Given that the distributions of *Kentropyx striata* and *Thamnodynastes pallidus* are geographically distant from Paraguay (Gallagher & Dixon, 1992; Bailey et al., 2005), we will not consider it to be present in the country until the publication of evidence confirming the Paraguayan records. In the case of *Xenodon newwiedi* there are some historical references without specific data (Bertoni, 1939; Gatti, 1955; Talbot, 1979), so we did not include this taxon in the analysis. Until there is a more clear definition of the *Bothrops newwiedi* group, we refer to Paraguayan populations as *B. diporus*.

Reptile locality records were taken from Cacciali et al. (2015) and Cabral and Weiler (2014), with the following taxonomic modifications: we recognize subspecies of *Boa*

constrictor (*B. c. amarali* and *B. c. occidentalis*) and *Oxyrhopus rhombifer* (*O. r. rhombifer* and *O. r. inaequifasciatus*) as different taxa. Additionally, *Erythrolamprus poecilogyrus* was treated as: *E. p. caesius*, *E. p. schotti*, and *E. p. caesius* × *E. p. schotti*. Additional locality records are based on Cacciali (2011) for *Leptodeira annulata*, Cacciali (2013) for *Philodryas patagoniensis*, *Sibynomorphus turgidus*, *Bothrops alternatus*, and *Crotalus durissus*, and Entiauspe-Neto et al. (2014) for *Apostolepis intermedia*. Records of *Phalotris* in Paraguay were based on Cabral and Cacciali (2015).

The exotic lizard *Hemidactylus mabouia* was excluded from the analysis given that it is an introduced species associated with human habitation and has no conservation value in the country. Also, where species are lacking specific geographical information they were excluded from the analysis, such as *Chironius exoletus* and *Lygophis anomalus*.

It is important to note that we based our records on published papers which had made an adequate study of specimens, and we avoid the use of databases because



Left: Kue Tuvy Indigenous Reserve: A common environmental feature observed in protected areas in Paraguay is lack of ecotone © Andrea Ferreira. Right: Caazapá National Park: Another problem often observed is the lack of buffer zones, here patches of protected forest are isolated among a matrix of field crops © Hugo Cabral

specimens are often erroneously identified leading to incorrect interpretations of the data (Hjarding et al., 2015). Presence records were used to generate a matrix of taxa × areas (Soberón, 2015), where ‘taxa’ refers to any species or subspecies recorded in Paraguay, and ‘areas’ corresponds to the existing 55 protected areas in Paraguay. Maps were generated using GPS TrackMaker v.13.9 and ArcGis 10. We differentiated two kinds of records on protected areas: ‘Confirmed’ records when a given locality record for a taxa falls within the borders of protected areas (black squares in Appendix I), and ‘Adjacent’ presence when a record came from the area surrounding the protected area (≈ 20 km or less) (white squares in Appendix I).

The national conservation status of each species (when available) is based on Motte et al. (2009) who followed the IUCN criteria. Global extinction risk is according to IUCN (2014). According to Motte et al. (2009), in Paraguay 14 reptile species are VU classified, six are EN, and four are CR (Table 2). *Bachia bresslaui* and *Philodryas livida* (this last not assessed by Motte et al., 2009) are the only regionally threatened species (VU after IUCN, 2014).

Finally, given that this analysis is based on collections and not on a systematic sampling across Paraguay, there could be some biases in the sampling effort, with some areas without samples, and others oversampled. To illustrate this effect, we plotted the records on a Paraguayan map with DIVA-GIS ver. 7.5, and we then analyzed the species richness with the transformation of ‘Point to Grid’ through simple grouping aggregation. The class intervals were automatically generated dividing the highest number of occurrences per grid by five intervals per class. We used a grid size of half a longitudinal degree (~ 51 km) by half a latitudinal degree (~ 55 km), anchored in the right lower corner.

RESULTS

A total of 1,789 record points were analyzed for 182 taxa (Appendix I). We found 467 confirmed records and 307 adjacent records of reptiles in Paraguayan protected areas (Appendix I). The areas with the most species recorded were *Reserva Ecológica Banco San Miguel y Bahía de Asunción* (41 confirmed and 17 adjacent) and *Reserva de Recursos Manejados Ñu Guazú* (25 confirmed and 29 adjacent). These two areas resulted in more than 50 confirmed records from protected areas in the vicinity of Asunción. The protected area with the third largest number of confirmed species is *Parque Nacional Defensores del Chaco* (40 confirmed and 2 adjacent), followed by *Reserva Natural Yacyreta* (38 confirmed), *Parque Nacional Río Negro* (33 confirmed and 7 adjacent), and *Parque Nacional Cerro Corá* (37 confirmed and 1 adjacent). Eleven protected areas showed no records (Appendix I).

Some species are widely distributed throughout the country and present in several protected areas (*Notomabuya frenata*, *Ameiva ameiva*, *Xenodon merremi*, and *Salvator merianae*). In other cases, numerous species have never been recorded in protected areas (nor adjacent to them), such as: *Amphisbaena steindachneri*, *A. trachura*, *Chironius exoletus*, *Homonota rupicola*, *Lygophis meridionalis*, *Micrurus lemniscatus carvalhoi*, *Ophiodes luciae*, *Oxyrhopus rhombifer rhombifer*, *Phalotris matogrossensis*, *Phalotris normanscotti*, *P. nigrilatus*, *Philodryas agassizii*, *P. livida*, *Phimophis guerini*, *Phrynosoma hilarii*, *Psomophis obtusus*, *Rhachidelus brazili*, and *Xenodon histricus*. It is important to highlight that *Amphisbaena albocingulata*, *Homonota rupicola*, *Ophiodes luciae*, *Phalotris normanscotti*, and *P. nigrilatus* are endemic to Paraguay, and so their absence from Paraguayan protected areas is particularly worrying.

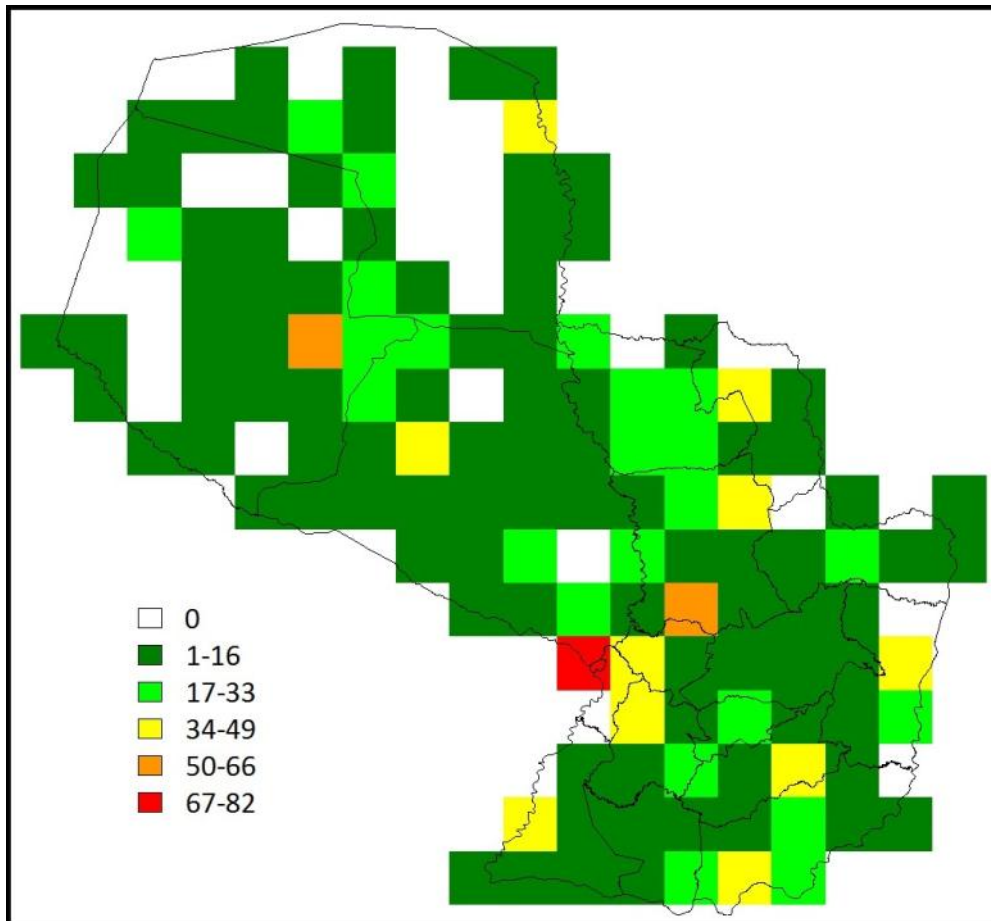


Figure 3: Grid of Paraguay showing species richness. As can be seen, most of the collection effort is focused around Asunción (capital city of Paraguay), the only red area. Several areas still remain unknown (white spaces). Colours reflect the number of species in each grid

With respect to the threatened taxa, three do not occur in any protected areas: *Phalotris nigrilatus*, *Philodryas agassizii*, and *Rhachidelus brazili* categorized as VU, EN, and CR in Motte et al. (2009) respectively. Regarding the total number of taxa analyzed, 18 are not found in protected areas, comprising 9.9 per cent of all reptile taxa found in Paraguay. Of the total number of species 90.1 per cent are found in at least one protected area of the SINASIP, or in adjacent areas.

Regarding sampling bias, we found that the grid with the highest number of occurrences, 82, is located in the area of Asunción, while several grids lack any information at all (Figure 3).

DISCUSSION

Paraguayan reptile diversity is poorly known. Collecting efforts are not representative and they do not truly represent the biogeographic patterns of the country (Cacciali & Ubilla, 2015). The *Reserva Ecológica Banco San Miguel y Bahía de Asunción* and *Reserva de Recursos Manejados Ñu Guazú* are both located in the surroundings of Asunción (capital city of Paraguay), and benefit from more intensive collecting efforts than other areas. Cacciali and Ubilla (2015) found that the highest 'diversity' hotspots for reptiles in Paraguay are: Asunción, Colonia Primavera (many collections between

1956 and 1971 in San Pedro Department at 24°27'S, 57°09'W), Filadelfia (main city of Paraguayan Chaco and capital of Boquerón Department at 22°21'S, 60°06'W), *Parque Nacional Defensores del Chaco*, and Yacyreta Island (here referred to as *Reserva Natural Yacyreta*). Thus, protected areas with a high number of confirmed records match with areas that have been well sampled, and they do not necessarily represent areas of high biodiversity.

Areas without confirmed records include *Monumento Natural Cerro Chovoreca*, *Reserva Natural Cerro Cabrera/Timane*, *Reserva Natural Cañada del Carmen*, *Reserva Natural Carapá*, *Reserva Natural Tabucay*, *Reserva para Parque Nacional Ñacunday*, *Reserva Ecológica Capiibary*, *Monumento Natural Cerro Chororí*, *Monumento Natural Cerro Koi*, *Isla Carrizal*, *Reserva Nacional Saltos del Guaira*, and *Reserva Natural Lote 1*. The lack of information from these areas is due to the difficulty of access or because no scientific collections were made during ecological assessments.

Based on this information, we conclude that 90.1 per cent of Paraguayan reptiles are under protection in protected areas. Nonetheless, some threatened or endemic species have not been recorded in protected areas. That is the case of the locally threatened snakes



***Philodryas livida* a globally threatened snake: there has been only one record in Paraguay, which was not in a protected area**
© Para La Tierra

Philodryas agassizii (EN) and *Rhachidelus brazili* (CR), two species that are poorly known in the country, or even worse the globally threatened *Philodryas livida*. This last species was not evaluated by Motte et al. (2009). Currently NatureServe and other institutions have been advancing Red List assessments for squamates, and there is already a complete assessment for the Western Hemisphere (Young, 2012). The global assessment of the conservation status of the species present in Paraguay would have important potential implications for further conservation actions in the country, given that currently only 28 species of Paraguayan reptiles are assessed, four of them threatened: *Acanthochelys pallidipectoris*, *Bachia bresslaui*, *Chelonoidis chilensis*, and *Philodryas livida*, but this last is not included for Paraguay (IUCN, 2014). Endemic reptiles in Paraguay are *Amphisbaena albocingulata*, *Homonota rupicola*, *Ophiodes luciae*, *Phalotris normanscottii*, and *Phalotris nigrilatus* (Ferrarezzi, 1993; Cacciali et al., 2007a, b; Perez et al., 2012; Cabral & Cacciali, 2015; Cacciali & Scott, 2015); only the first of these was reported in protected areas.

Some species with adjacent records in protected areas include *Paleosuchus palpebrosus*, *Norops meridionalis*, *Liolaemus chacoensis*, *Liotyphlops ternetzii*, *Atractus paraguayensis*, *Phimophis vittatus*, *Xenodon dorbignyi*, and *Micrurus lemniscatus*. All except for *P. palpebrosus* and *M. lemniscatus*, have a wider distribution in the country. *M. lemniscatus* is known only from Campo 9 (Caaguazú Department, at 25°25'S, 55°34'W) at 8.9 km

from *Reserva Natural Ypeti*. In the particular case of *P. palpebrosus*, this is a caiman whose presence in Paraguay seems to be occasional with probably the Río Apa as its southern distribution limit. The species was recorded 30 km SW from Bella Vista (Amambay Department, at 22°15'S, 56°46'W) at 15.7 km from *Parque Nacional Bella Vista*.

The distribution of some reptiles is little known and understood; for example, the ranges of *P. agassizii* and *Tomodon ocellatus* are unknown (Cabral & Caballero, 2013). Some reptiles in Paraguay are only known by one or two records (Cacciali et al., 2015), and in these cases, some protected areas play a crucial role in their conservation, such as *Parque Nacional Cerro Corá* for *Bachia bresslaui*, *Ophiodes fragilis*, and *Chironius flavolineatus*; *Parque Nacional San Rafael* for *Ophiodes* aff. *striatus*, *Atractus thalesdelemai*, and *Micrurus silviae*; *Reserva Natural Yacyreta* for *Mussurana quimi* and *Oxyrhopus rhombifer rhombifer*; *Parque Nacional Defensores del Chaco* for *Homonota* aff. *borelli* and *Sibynomorphus lavillai*; and *Reserva Natural del Bosque Mbaracayú* for *Drymoluber brazili*.

Special attention should be focused on 'Reserva Natural' Laguna Blanca, a small area of 805 ha located in the Department of San Pedro. The area was under temporary protection (legal protection lapsed in February 2015), and was supported by tourism activities and conservation carried out by the NGO, Para La Tierra

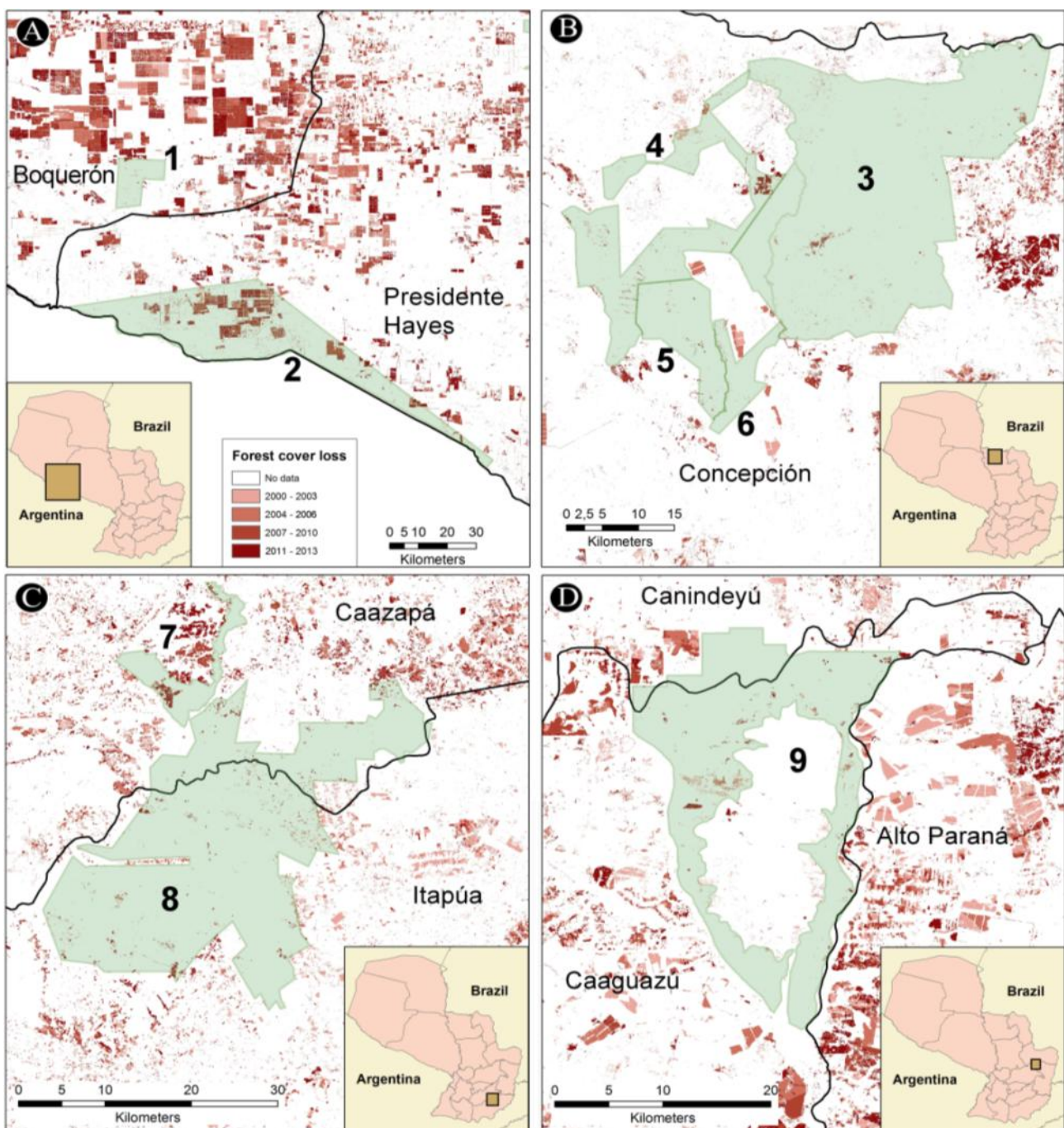


Figure 4. In Paraguay deforestation sometimes impacts protected areas as can be seen here: A: Reserva Natural Toro Mocho (1), Parque Nacional Tinfunqué (2). B: Parque Nacional Paso Bravo (3), Reserva Natural Tagatiyá mi (4), Parque Nacional San Luis (5), Reserva Natural Cerrados del Tagatiyá (6). C: Reserva Natural Tapytá (7), Parque Nacional San Rafael (8), and Reserva Natural Morombi (9). References to loss of forest cover values shown in A. Deforestation values were taken from Global Forest Watch (www.globalforestwatch.org/), accessed on 28 August 2015

(paralatierra.org/index.html). Snakes such as *Lygophis paucidens*, *Philodryas nattereri*, and *P. livida* are only found here (Cacciali et al., 2013; Smith et al., 2013, 2014).

For all these records of threatened, endemic or rare species that fall outside of the protected area network, the focus should be to complete the scientific documentation, looking for alternatives that ensure their protection either through the establishment of new protected areas or through the implementation of 'other

effective area-based conservation measures' (Watson et al., 2014). A useful aspect in this context is the KBAs (Key Biodiversity Areas) approach (Eken et al., 2004; Langhammer et al., 2007), which has already been adopted in Paraguay for birds (Yanosky & Cartes, 2008a, b). In some cases, stronger actions should be taken, given that in most cases the Paraguayan 'Important Bird Areas' (IBAs) match with protected areas (Appendix II); but in those cases that do not match, then the IBAs have no official measures (Cartes & Yanosky, 2008).



View from Paraguay River in the Paraguayan Pantanal at *Parque Nacional Río Negro*. The property is owned by the association *Guyra Paraguay*; this is the only land in the country declared for perpetual conservation through its titles © Alberto Yanosky

The increasingly accelerated habitat destruction and fragmentation in different Paraguayan habitat types lead to patches (as occurred with Atlantic Forest *sensu*, Huang et al., 2007) which will lead to the isolation of populations as stated by Smith et al. (2014) for *P. livida*. Paraguay is a global focus of forest loss (Hansen et al., 2013), with a deforestation rate of 179,000 ha per year (FAO, 2010), given the advance of habitat transformation for soy and beef (Guereña & Riquelme, 2013).

All these rural practices make it difficult to conserve natural habitats in Paraguay, and conservationists should look for synergic practices between conservation and development (Naidoo & Ricketts, 2006; Naidoo et al., 2006). In addition, natural protected areas in Paraguay have several problems; the most common and alarming is that the legal size of the areas does not match with reality, the legal area always being reported as bigger. Furthermore, only two areas have management plans (Cartes, 2013). Some protected areas are also affected by deforestation (Figure 4) or other anthropogenic

activities. However, it is important to note that the objective of this paper is not an analysis of the situation of the protected areas' network; instead the aim is to review strategies to conserve species and their populations, nevertheless protected areas require an analysis of their effectiveness to secure their conservation in perpetuity.

Finding reptiles is frequently a matter of luck, this being especially true for snakes (Hartmann et al., 2009). The species mentioned above, as well as many others that are known by few specimens, could have wider distributions and could be present in protected areas; the lack of accurate sampling being responsible for this shortage in knowledge. In Figure 3, it is possible to see how sampling effort is biased in areas surrounding the capital city of Paraguay, with other zones completely lacking information. This study thus also highlights possible areas which should be the object of scientific sampling to generate information about the real effectiveness of protected areas for biodiversity conservation.

APPENDIX I

List of taxa analyzed in this paper, and their confirmed (■) and probable (□) presence in Paraguayan protected areas. We have used the original área name: **01** Monumento Natural Cerro Chovoreca, **02** Reserva Natural Cerro Cabrera/Timane, **03** Parque Nacional Río Negro, **04** Parque Nacional Defensores del Chaco, **05** Parque Nacional Médanos del Chaco, **06** Reserva Natural Ñu Guazú, **07** Parque Nacional Teniente Enciso, **08** Reserva Natural Cañada del Carmen, **09** Reserva Natural Yaguareté Porã, **10** Reserva Natural Palmar Quemado, **11** Reserva Natural Salazar, **12** Reserva Natural Toro Mocho, **13** Parque Nacional Tinfunqué, **14** Parque Nacional Paso Bravo, **15** Reserva Natural Tagatiyá mi, **16** Parque Nacional San Luis, **17** Reserva Natural Cerrados del Tagatiyá, **18** Parque Nacional Bella Vista, **19** Reserva Natural Arroyo Blanco, **20** Parque Nacional Cerro Corá, **21** Reserva Natural Ka'i Ragüe, **22** Reserva Natural del Bosque Mbaracayú, **23** Refugio Biológico Binacional Mbaracayú, **24** Reserva Natural Carapá, **25** Reserva Ecológica Limoy, **26** Reserva Ecológica Itabó, **27** Reserva Natural Pikyry, **28** Reserva Natural Tati Yupi, **29** Reserva Natural Maharishi, **30** Monumento Científico Moisés Bertoni, **31** Reserva Natural Tabucay, **32** Reserva para Parque Nacional Ñacunday, **33** Reserva Nacional Kuri'y, **34** Reserva Natural Morombi, **35** Reserva Ecológica Capiibary, **36** Reserva Natural Ypeti, **37** Reserva de Recursos Manejados Yvyturuzú, **38** Parque Nacional Caazapá, **39** Reserva Natural Tapytá, **40** Parque Nacional San Rafael, **41** Parque Nacional Lago Ypacaraí, **42** Paisaje Protegido Cerro 2 de Oro, **43** Reserva Ecológica Banco San Miguel y Bahía de Asunción, **44** Reserva Nacional Cerro Lambaré, **45** Parque Nacional Lago Ypoá, **46** Monumento Natural Macizo Acahay, **47** Parque Nacional Ybycuí, **48** Refugio de Vida Silvestre Yabebyry, **49** Reserva Natural Yacyreta, **50** Reserva de Recursos Manejados Ñu Guazú, **51** Monumento Natural Cerro Chororí, **52** Monumento Natural Cerro Koi, **53** Isla Carrizal, **54** Reserva Nacional Saltos del Guaira, **55** Reserva Natural Lote 1.

Taxa ▼	ASPs ▶	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
<i>Acanthochelys macrocephala</i>				■	■																							
<i>Acanthochelys pallidipectoris</i>												■																
<i>Hydromedusa tectifera</i>																												
<i>Mesoclemys vanderhaegei</i>																						■		■				
<i>Phrynosops geoffroanus</i>																												
<i>Phrynosops hilarii</i>																												
<i>Phrynosops williamsi</i>																												
<i>Kinosternon scorpioides</i>													□															
<i>Chelonoidis carbonaria</i>				□	■							■			□	■	□											
<i>Chelonoidis chilensis</i>			□		■	□		■				□		■														
<i>Caiman latirostris</i>											□												■			■	■	□
<i>Caiman yacare</i>				■								□		■														
<i>Paleosuchus palpebrosus</i>																				□								
<i>Amphisbaena alba</i>											□																■	
<i>Amphisbaena albocingulata</i>																												
<i>Amphisbaena angustifrons</i>																												
<i>Amphisbaena bolivica</i>																												
<i>Amphisbaena camura</i>												□																
<i>Amphisbaena leeseri</i>																■	□	□	□									
<i>Amphisbaena mertensi</i>																							■		■			
<i>Amphisbaena prunicolor</i>																■	□	□	□									
<i>Amphisbaena roberti</i>																							■					
<i>Amphisbaena steindachneri</i>																												
<i>Amphisbaena trachura</i>																												
<i>Leposternon microcephalum</i>																								□				
<i>Lygodactylus wetzeli</i>																												
<i>Homonota aff. borelli</i>																												
<i>Homonota fasciata</i>																												
<i>Homonota rupicola</i>																												
<i>Phyllopezus pollicaris</i>																												
<i>Bachia bresslaui</i>																												
<i>Cercosaura ocellata</i>																												
<i>Cercosaura schreibersii</i>													□															
<i>Colobosaura modesta</i>																											□	□
<i>Micrablepharus maximiliani</i>																												
<i>Vanzosaura rubricauda</i>																												
<i>Iguana iguana</i>																												
<i>Anisolepis longicauda</i>																												
<i>Norops meridionalis</i>																												
<i>Polychrus acutirostris</i>																												
<i>Ameiva ameiva</i>																												
<i>Ameivula abalosi</i>																												
<i>Ameivula ocellifera</i>																												
<i>Dracaena paraguayensis</i>																												
<i>Kentropyx viridistriga</i>																												
<i>Salvator duseni</i>																												
<i>Salvator merianae</i>																												
<i>Salvator rufescens</i>																												
<i>Teiurus oculatus</i>																												
<i>Teiurus teyou</i>																												
<i>Liolaemus azarai</i>																												
<i>Liolaemus chacoensis</i>																												
<i>Stenocercus caducus</i>																												
<i>Tropidurus catalanensis</i>																												
<i>Tropidurus etheridgei</i>																												
<i>Tropidurus guarani</i>																												
<i>Tropidurus spinulosus</i>																												
<i>Aspronema dorsivittatum</i>																												
<i>Copeoglossum nigropunctatum</i>																												

Taxa ▼	ASPs ▶	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55
<i>Phimophis vittatus</i>																													
<i>Pseudoboa nigra</i>																													
<i>Pseudoeryx plicatilis</i>																	■												
<i>Psomophis genimaculatus</i>																													
<i>Psomophis obtusus</i>																													
<i>Rhachidelus brazili</i>																													
<i>Sibynomorphus lavillai</i>																													
<i>Sibynomorphus mikanii</i>		■	□																										
<i>Sibynomorphus turgidus</i>														■			■	□						■	■				
<i>Sibynomorphus ventrimaculatus</i>																	■	■					□	■	■				
<i>Taeniophallus occipitalis</i>																													□
<i>Thammodynastes chaquensis</i>																													■
<i>Thammodynastes hypoconia</i>																													□
<i>Thammodynastes lanei</i>																													■
<i>Thammodynastes strigatus</i>														■															■
<i>Tomodon dorsatus</i>		■	■																										
<i>Tomodon ocellatus</i>																													
<i>Xenodon dorbignyi</i>																													□
<i>Xenodon histricus</i>																													
<i>Xenodon merremi</i>		□											■	□	■	□	■	□			■	■	■	■	■				
<i>Xenodon pulcher</i>																													
<i>Xenophilis undulatus</i>																													
<i>Micrurus altirostris</i>																													
<i>Micrurus baliocoryphus</i>																													□
<i>Micrurus corallinus</i>		■	■																										
<i>Micrurus frontalis</i>																													■
<i>Micrurus lemniscatus carvalhoi</i>																													
<i>Micrurus pyrrhocryptus</i>																													
<i>Micrurus silviae</i>																													
<i>Bothrops alternatus</i>		■																											■
<i>Bothrops diporus</i>																													■
<i>Bothrops jararaca</i>		■																											
<i>Bothrops jararacussu</i>		■																											■
<i>Bothrops moojeni</i>		■																											
<i>Bothrops pauloensis</i>																													
<i>Crotalus durissus</i>																													□
Total confirmed		17	9	0	0	0	0	2	0	1	9	5	1	26	8	0	41	8	3	6	21	6	38	25	0	0	0	0	0
Total probables		12	4	1	0	0	2	2	0	2	2	5	11	5	14	1	17	10	2	0	6	8	0	29	0	0	0	0	0

APPENDIX II

Details of some characteristics of the Paraguayan protected areas, such as land area (in hectares), and number of threatened (Thr) and endemic (End) species protected by each area, based on confirmed records only. Also, we include a column to show if the area matches with a Paraguayan IBA. Numbers (left column) correspond to those in Appendix I.

	Protected Area	Land area (ha)	Thr	End	IBA
1	Cerro Chovoreca	100,953	0	0	
2	Cerro Cabrera/Timane	125,823	0	0	
3	Río Negro	123,786	1	0	X
4	Defensores del Chaco	720,000	0	0	X
5	Médanos del Chaco	514,233	0	0	X
6	Ñu Guazú (Boquerón)	50,000	0	0	
7	Teniente Enciso	40,000	0	0	X
8	Cañada del Carmen	3,973	0	0	
9	Yaguareté Porã	78,549	0	0	
10	Palmar Quemado	9,478	0	0	
11	Estancia Salazar	12,450	0	0	
12	Toro Mocho	18,000	0	0	
13	Tinfunqué	241,320	0	0	X
14	Paso Bravo	103,018	0	0	X
15	Tagatiyá mi	33,789	2	0	X
16	San Luis	10,273	1	0	X
17	Cerrados del Tagatiyá	5,700	0	0	X
18	Bella Vista	7,311	0	0	

	Protected Area	Land area (ha)	Thr	End	IBA
19	Arroyo Blanco	5,714	1	0	X
20	Cerro Corá	5,538	4	0	
21	Ka'i Ragüe	1,859	1	0	
22	Mbaracayú (Reserve)	64,405	7	0	X
23	Mbaracayú (Refuge)	1,629	0	0	
24	Carapá	3,658	0	0	X
25	Limoy	13,600	2	0	X
26	Itabó	17,879	2	0	X
27	Pikyry	1,629	4	0	
28	Tati Yupi	2,037	4	0	
29	Maharishi	343	2	0	
30	Moisés Bertoni	200	0	0	
31	Tabucay	559	0	0	
32	Ñacunday	2,000	0	0	
33	Kuri'y	2,000	0	0	
34	Morombi	25,000	0	0	X
35	Capiibary	3,082	0	0	
36	Ypeti	13,592	0	0	X
37	Yvyturuzú	24,000	0	0	
38	Caazapá	16,000	0	0	X
39	Tapytá	4,736	0	0	X
40	San Rafael	72,849	2	0	X
41	Lago Ypacaraí	16,000	0	0	
42	Cerro 2 de Oro	44	0	0	
43	Banco San Miguel	300	0	0	X
44	Cerro Lambaré	3	0	0	
45	Lago Ypoá	100,000	0	0	
46	Macizo Acahay	2,500	0	1	
47	Ybycuí	5,000	0	0	
48	Yabebyry	30,000	0	0	X
49	Yacyreta	8,345	4	0	X
50	Ñu Guazú (Central)	280	0	0	
51	Cerro Chororí	5	0	0	
52	Cerro Koi	12	0	0	
53	Isla Carrizal	4,371	0	0	
54	Saltos del Guaira	900	0	0	
55	Lote 1	5,364	0	0	

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REFERENCES

- Bailey, J.R., Thomas, R.A., and Jorge da Silva Jr., N. (2005). A revision of the South American snake genus *Thamnodynastes* Wagler, 1830 (Serpentes, Colubridae, Tachymenini). I. Two new species of *Thamnodynastes* from Central Brazil and adjacent areas, with a redefinition of and neotype designation for *Thamnodynastes*. *Phyllomedusa* 4: 83-102. DOI: <http://dx.doi.org/10.11606/issn.2316-9079.v4i2p83-101>
- Bertoni, A. de W. (1939). Catálogos sistemáticos de los vertebrados de Paraguay. *Revista de la Sociedad Científica del Paraguay* 4: 3-60.
- Bragayrac, E. (2014). Medios de vida y cambio climático en el Chaco Paraguayo. *Revista Debate* 2: 12-20.
- Caballero, J., Palacios, F., Arévalos, F., Rodas, O. and Yanosky, A.A. (2014). Cambio de uso de la tierra en el Gran Chaco Americano en el año 2013. *Paraquaria Natural* 2: 21-28.
- Cabral, H. and Caballero, A. (2013). Confirmación de *Tomodon ocellatus* Dumeril, Bibron & Duméril, 1854 y primer ejemplar de referencia de *Micrurus silviae* Di-Bernardo, Borges-Martins & Silva, 2007 para Paraguay. *Boletín del Museo Nacional de Historia Natural del Paraguay* 17: 63-66.
- Cabral, H. and Cacciali, P. (2015). A new species of *Phalotris* (Serpentes: Dipsadidae) from the Paraguayan Chaco. *Herpetologica* 71: 72-77. DOI: <http://dx.doi.org/10.1655/HERPETOLOGICA-D-14-00021>
- Cabral, H. and Weiler, A. (2014). Lista comentada de los reptiles de la Colección Zoológica de la Facultad de Ciencias Exactas y Naturales de Asunción, Paraguay. *Cuadernos de Herpetología* 28: 19-28.
- Cacciali, P. (2011). Nueva localidad para *Leptodeira annulata* (Serpentes: Dipsadidae) en la Región Oriental de Paraguay, y datos sobre su distribución. *Reportes Científicos de FaCEN* 2: 73-76.

- Cacciali, P. (2013). Diversidad y selección de hábitat de la fauna de serpientes en Kangüery (Área para Parque San Rafael). *Boletín del Museo Nacional de Historia Natural del Paraguay* 17: 29-39.
- Cacciali, P. and Scott, N. (2015). Key to the *Ophiodes* (Squamata: Sauria: Diploglossidae) of Paraguay with the description of a new species. *Zootaxa* 3980: 42-50. DOI: <http://dx.doi.org/10.11646/zootaxa.3980.1.2>
- Cacciali, P. and Ubilla, M. (2015). Distribución de reptiles en Paraguay: un aporte al conocimiento de su biogeografía. In: Smith, P. (ed.). *Contribuciones para la bioecología paraguaya y regional. Homenaje al Biólogo e Investigador Andrés Óscar Contreras Chialchia*. Pilar: Universidad Nacional de Pilar. In Press.
- Cacciali, P., Ávila, I. and Bauer, F. (2007a). A new species of *Homonota* (Squamata, Gekkonidae) from Paraguay, with a key to the genus. *Phyllomedusa* 6: 137-146. DOI: <http://dx.doi.org/10.11606/issn.2316-9079.v6i2p137-146>
- Cacciali, P., Carreira, S. and Scott, N. (2007b). Redescription of *Phalotris nigrilatus* Ferrarezzi, 1993 (Serpentes: Colubridae: Xenodontinae). *Herpetologica* 63: 552-559. DOI: [http://dx.doi.org/10.1655/0018-0831\(2007\)63\[552:ROPNFS\]2.0.CO;2](http://dx.doi.org/10.1655/0018-0831(2007)63[552:ROPNFS]2.0.CO;2)
- Cacciali, P., Smith, P., Källberg, A., Pheasey, H. and Atkinson, K. (2013). Reptilia, Squamata, Serpentes, *Lygophis paucidens* Hoge, 1952: First records for Paraguay. *Check List* 9: 131-132. DOI: <http://dx.doi.org/10.15560/9.1.131>
- Cacciali, P., Scott, N., Aquino, A.L., Smith, P. and Fitzgerald, L. (2015). Annotated taxonomic and distributional checklist of the reptiles of Paraguay. *Special Publications of the Museum of Southwestern Biology*: In Press.
- Cartes, J.L. (2003). Brief history of conservation in the Interior Atlantic Forest. In: Galindo-Leal, C. & Gusmão Câmara, I. (eds.). *The Atlantic Forest of South America*, pp. 269-287. London and Washington: Island Press.
- Cartes, J.L. (2013). La urgencia de tomar medidas correctas al respecto del manejo de las Áreas Protegidas. *Paraquaria Natural* 1: 39-42.
- Cartes, J.L. and Yanosky, A.A. (2008). Situación general de las IBAs en Paraguay: estrategias de conservación efectivas. In: Cartes, J.L., (ed.). *Áreas de Importancia para la Conservación de las Aves en Paraguay*, pp. 315-334. Asunción: Guyra Paraguay / BirdLife Internacional.
- Carvalho, A.L.G. (2013). On the distribution and conservation of the South American lizard genus *Tropidurus* Wied-Neuwied, 1825 (Squamata: Tropiduridae). *Zootaxa* 3640: 42-56. DOI: <http://dx.doi.org/10.11646/zootaxa.3640.1.3>
- Di Bitetti, M.S., Placci, G. and Dietz, L.A. (2003). *Una Visión de Biodiversidad para la Ecorregión del Bosque Atlántico del Alto Paraná: Diseño de un Paisaje para la Conservación de la Biodiversidad y prioridades para las acciones de conservación*. Washington, D.C., U.S.A.: World Wildlife Fund.
- Dudley, N. and Stolton, S. (2008). Drinking water and protected areas. In *Protected Areas in Today's World: Their value and benefits for the welfare of the Planet*: 37-41. Technical Series 36. Montreal: Secretariat of the Convention of Biological Diversity.
- Eken, G., Bennun, L., Brooks, T.M., Darwall, W., Fishpool, L.D.C., Foster, M., Knox, D., Langhammer, P., Matiku, P., Radford, E., Salaman, P., Sechrest, W., Smith, M.L., Spector, S., and Tordoff, A. (2004). Key Biodiversity Areas as site conservation targets. *BioScience* 54: 1110-1118. DOI: [http://dx.doi.org/10.1641/0006-3568\(2004\)054\[1110:KBAASC\]2.0.CO;2](http://dx.doi.org/10.1641/0006-3568(2004)054[1110:KBAASC]2.0.CO;2)
- Entiauspe-Neto, O., de Lema, T. and Cabral, H. (2014). *Apostolepis intermedia* Koslowsky, 1898 (Serpentes: Xenodontinae: Elapomorhini): First record for Paraguay. *Check List* 10: 600-601. DOI: <http://dx.doi.org/10.15560/10.3.600>
- FAO. (2010). *Global Forest Resources Assessment 2010*. Main Report, Forestry Paper 163. Rome: FAO.
- Ferrarezzi, H. (1993). Nota sobre o gênero *Phalotris* com revisão do grupo *nasutus* e descrição de três novas espécies (Serpentes, Colubridae, Xenodontinae). *Memorias do Instituto Butantan* 55: 21-38.
- Gallagher, D.S. and Dixon, J.R. (1992). Taxonomic revision of the South American lizard genus *Kentropyx* Spix (Sauria, Teiidae). *Bolletino dei Museo Regionale di Scienze Naturali di Torino* 10: 125-171.
- Gatti, C. (1955). Las culebras venenosas del Paraguay. *Revista Médica del Paraguay* 1: 81-100.
- Guereña, A. and Riquelme, Q. (2013). *The soy mirage. The limits of corporate social responsibility: the case of the company Desarrollo Agrícola del Paraguay*. Oxford: Oxfam Research Reports.
- Hansen, M.C., Potapov, P.V., Moore, R., Hancher, M., Turubanova, S., Tyukavina, A., Thau, D., Stehman, S.V., Goetz, S.J., Loveland, T.R., Kommareddy, A., Egorov, A., Chini, L., Jistice, C.O. and Townshend, J.R. (2013). High-Resolution global maps of 21st-Century forest cover change. *Science* 342: 850-853. DOI: [10.1126/science.1244693](https://doi.org/10.1126/science.1244693)
- Hartmann, P.A., Hartmann, M.T. and Martins, M. (2009). Ecology of a snake assemblage in the Atlantic Forest of southeastern Brazil. *Papeis Avulsos de Zoolgia* 49: 343-360.
- Hjarding, A., Tolley, K.A., and Burgess, N.D. (2015). Red list assessment of East Africa chameleons: a case study of why we need experts. *Oryx* 49: 652-658. DOI: <http://dx.doi.org/10.1017/S0030605313001427>
- Huang, C., Kim, S., Altstatt, A., Townshend, J., Davis, P., Song, K., Tucker, C., Rodas, O., Yanosky, A.A., Clay, R. and Musinky, J. (2007). Rapid loss of Paraguay's Atlantic forest and the status of protected areas — A Landsat assessment. *Remote Sensing of Environment* 106: 460-466. DOI: [10.1016/j.rse.2006.09.016](https://doi.org/10.1016/j.rse.2006.09.016)
- IUCN. (2014). The IUCN Red List of Threatened Species. Version 2014.2. <www.iucnredlist.org>. Downloaded on 18 August 2014.
- Langhammer, P.F., Bakarr, M.I., Bennun, L.A., Brooks, T.M., Clay, R.P., Darwall, W., De Silva, N., Edgar, G.J., Eken, G., Fishpool, L.D.C., da Fonseca, G.A.B., Foster, M.N., Knox, D.H., Matiku, P., Radford, E.A., Rodrigues, A.S.L., Salaman, P., Sechrest, W., and Tordoff, A.W. (2007). *Identification and Gap Analysis of Key Biodiversity Areas: Targets for Comprehensive Protected Area System*. Gland: IUCN.
- Lopoukhine, N. (2008). Protected areas – For life's sake. In *Protected Areas in Today's World: Their value and benefits for the welfare of the Planet*: 1–3. Technical Series 36. Montreal: Secretariat of the Convention on Biological Diversity.
- Mansourian, S., Higgins-Zogib, L., Dudley, N. and Stolton, S. (2008). Poverty and protected areas. In *Protected Areas in Today's World: Their value and benefits for the welfare of the Planet*: 16–28. Technical Series 36. Montreal: Secretariat of the Convention on Biological Diversity.
- Motte, M., Núñez, K., Cacciali, P., Brusquetti, F., Scott, N. and Aquino, A.L. (2009). Categorización del estado de

- conservación de los anfibios y reptiles de Paraguay. *Cuadernos de Herpetología* 23: 5-18.
- Myers, N., Mittermeier, R., Mittermeier, C., da Fonseca, C. and Kent, J. (2000). Biodiversity hotspots for conservation priorities. *Nature* 403: 853-858. DOI: 10.1038/35002501
- Naidoo, R. and Ricketts, T. (2006). Mapping the Economic Costs and Benefits of Conservation. *PLoS Biology* 4: 2153-2164. DOI: 10.1371/journal.pbio.0040360
- Naidoo, R., Balmford, A., Ferraro, P.J., Polasky, S., Ricketts, T.H. and Rouget, M. (2006). Integrating economic costs into conservation planning. *Trends in Ecology and Evolution* 21: 681-687. DOI: 10.1016/j.tree.2006.10.003
- Palacios, R. (2007). Estrategias para la conservación de la biodiversidad. In: Salas-Dueñas, D. & Facetti, J.F., (eds.). *Biodiversidad del Paraguay, Una aproximación a sus realidades*, pp. 207-221. Asunción: Fundación Moisés Bertoni. Asunción.
- Perez, R., Ribeiro, S. and Borges-Martins, M. (2012). Reappraisal of the taxonomic status of *Amphisbaena prunicolor* (Cope 1885) and *Amphisbaena albocingulata* Boettger 1885 (Amphisbaenia: Amphisbaenidae). *Zootaxa* 3550: 1-25.
- Possingham, H.P., Wilson, K.A., Andelman, S.J. and Vynne, C.H. (2007). Protected areas: Goals, limitations, and design. In: Groom, M., Meffe, G. & Carroll, R., (eds.). *Principles of Conservation Biology*, pp. 509-551. Massachusetts: Sinauer Associates Inc.
- Scherl, L.M. and Emerton, L. (2008). Protected areas contributing to poverty reduction. In *Protected Areas in Today's World: Their value and benefits for the welfare of the Planet*: 4-17. Technical Series 36. Montreal: Secretariat of the Convention of Biological Diversity.
- SEAM. (2009). *Sistema Nacional de Áreas Silvestres: Plan Estratégico 2010-2015*. Asunción, Paraguay: Secretaría del Ambiente.
- Smith, P., Scott, N., Cacciali, P., Atkinson, K. and Pheasey, H. (2013). Confirmation of the presence of *Philodryas natterri* Steindachner, 1870, in Paraguay. *Herpetozoa* 26: 91-94.
- Smith, P., Cacciali, P., Scott, N., del Castillo, H., Pheasey, H. and Atkinson, K. (2014). First record of globally-threatened Cerrado endemic snake *Philodryas livida* (Amaral, 1923) (Serpentes, Dipsadidae) from Paraguay, and the importance of the Reserva Natural Laguna Blanca to its conservation. *Cuadernos de Herpetología* 28: 169-171.
- Soberón, J. (2015). Pairwise versus presence-absence approaches for analyzing biodiversity patterns. *Journal of Biogeography* 42: 803-808. DOI: 10.1111/jbi.12475
- Talbot, J.J. (1979). Una nueva lista sistemática de reptiles del Paraguay. *Informes Científicos del Instituto de Ciencias Básicas* 2: 76-94.
- Watson, J.E., Dudley, N., Segan, D.B. and Hockings, M. (2014). The performance and potential of protected areas. *Nature* 515: 67-73. DOI: 10.1038/nature13947
- Yanosky, A.A. (2013). The challenge of conserving a natural Chaco habitat. *Paraquaria Natural* 1: 32-34.
- Yanosky, A.A., and Cartes, J.L. (2008a). La potencialidad de las IBAs en un contexto socioeconómico. In: Cartes, J.L., (ed.). *Áreas de Importancia para la Conservación de las Aves en Paraguay*, pp. 335-394. Asunción: Guyra Paraguay / BirdLife Internacional.
- Yanosky, A.A., and Cartes, J.L. (2008b). La conservación de las IBAs en Paraguay: desafíos estratégicos y próximos pasos. In: Cartes, J.L., (ed.). *Áreas de Importancia para la Conservación de las Aves en Paraguay*, pp. 411-418. Asunción: Guyra Paraguay / BirdLife Internacional.
- Young, B.E. (2012). Red listing Central American Squamates. *Herpetological Review* 43: 368-370.

RESUMEN

En Paraguay, la tasa más alta de deforestación fue alcanzada en los años 2000, y en algunos lugares las áreas protegidas son el único vestigio de la estructura de los ecosistemas originales. Paraguay cuenta actualmente con 57 áreas protegidas con las que el 15,2 por ciento del territorio nacional está bajo protección. En este trabajo evaluamos la eficacia del sistema de áreas protegidas de Paraguay (SINASIP) para la conservación de los reptiles. Generamos una matriz de taxones × áreas de acuerdo a 1.789 registros para 182 taxones. Las áreas con mayor número de especies documentadas fueron la “Reserva Ecológica Banco San Miguel y Bahía de Asunción” y la “Reserva de Recursos Manejados Ñu Guazú”. Once áreas protegidas no mostraron registros. Algunas especies están ampliamente distribuidas en el país y presentes en varias unidades de conservación; pero en otros casos, numerosas especies nunca han sido registradas en estas áreas. Tres especies nacionalmente amenazadas (*Phalotris nigrilatus*, *Philodryas agassizii* y *Rhachidelus brazili*) y una globalmente amenazada (*Philodryas livida*) están actualmente sin protección en el Paraguay, así como las especies endémicas (*Homonota rupicola*, *Phalotris normanscottii* y *Phalotris nigrilatus*). En la actualidad el 90,1 por ciento del total de reptiles se encuentran en al menos un área protegida en el país. Además, mostramos cómo los esfuerzos de muestreo están sesgados y concentrados en los alrededores de la ciudad capital, y por lo tanto debe considerarse la realización de un muestreo sistemático en el país. Más allá de la protección legal en las unidades de conservación y las estrategias para la conservación de especies y sus poblaciones, las áreas protegidas todavía requieren de un análisis de la eficacia para garantizar la conservación a perpetuidad.

RÉSUMÉ

Au Paraguay, le plus haut taux de déforestation fut atteint dans les années 2000, et dans certains endroits les aires protégées sont le seul vestige de la structure des écosystèmes originaux. Le Paraguay compte actuellement 57 aires protégées, soit 15,2 % du territoire national sous protection. Dans ce travail nous évaluons l'efficacité du système des aires protégées au Paraguay (SINASIP) pour la conservation des reptiles. Nous avons généré une matrice de taxons × aires protégées en fonction de 1789 dossiers pour 182 taxons. Les aires protégées ayant le plus grand nombre d'espèces documentées sont la "Reserva Ecológica Banco San Miguel y Bahía de Asunción" et la "Reserva de Recursos Manejados Ñu Guazú". Onze aires protégées n'ont pas fourni de registres. Certaines espèces sont largement réparties à travers le pays et sont présentes dans plusieurs aires protégées; mais dans d'autres cas, de nombreuses espèces n'ont jamais été enregistrées dans ces régions. Trois espèces menacées à l'échelle nationale (*Phalotris nigrilatus*, *Philodryas agassizii* et *Rhachidelus brazili*), et une espèce menacée à l'échelle mondiale (*Philodryas livida*), vivent actuellement sans protection au Paraguay, ainsi que des espèces endémiques *Homonota rupicola*, *Ophiodes luciae*, *Phalotris normanscotti* et *Phalotris nigrilatus*. Actuellement, 90,1% des reptiles se trouvent dans au moins une aire protégée du pays. En outre, nous mettons en lumière les limites de l'échantillonnage actuel, qui se trouve concentré autour de la capitale, et démontrons de ce fait le besoin d'un meilleur échantillonnage systématique dans le pays. Au-delà de la protection juridique assurée par des aires protégées et des stratégies pour la conservation des espèces et de leurs populations, une analyse de l'efficacité des aires protégées pour assurer la conservation durable à long terme s'avère nécessaire.